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JPRS 84684

4 November 1983

# USSR Report

ENERGY

No. 164

19990510 085

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ENERGY

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## OIL AND GAS

### REPORT FROM THE BAKHAR FIELD

Baku VYSHKA in Russian 24 Jun 83 p 1

[Article by V. Gol'tsev, Peschanyy: "A Difficult Watch in the Sea"]

[Excerpt] The off-shore Bakhar field is impressive in the size of its hydrotechnical facilities. Above the calm of the sea rise more and more new man-made islands with drilling towers: the storming of the earth's interior for its riches of raw materials continues. And each well that is drilled becomes an important addition to the daily extraction. This section now accounts for two thirds of the oil and more than a half of the gas that are extracted in this NGDU oil and gas extraction administration imeni Serebrovskiy.

The deputy chief of the NGDU that extracts natural gas, Rakhman Kurbanov, reports that "Bakhar is an important and promising sector in our administration. For this reason work here is always under the close scrutiny of the entire collective. Reliable radio telephone communications help to keep us informed with the individual foundations, where the off-shore oil workers are on duty for several days at a time."

The changes are readily apparent. Some seven million rubles have been spent on the construction of facilities for the Bakhar deposit. Quite a bit has been done. For example, all individual foundations have been equipped with technological units, which ensure the individual measuring of the well yields. A second oil and gas gathering point has been built. And a network of underwater pipelines has been built. The efficiency of the off-shore oil and gas extraction rose when they were put into operation.

The chief of the deposit, Nizami Iskenderov, reports that "now a system of a separate network for transporting the fuel is in operation. The natural gas that is extracted is moved to land via five lines; the oil is moved through two lines. Due to this the wells are operating at the maximum speed and the entire oil conveyor operates smoothly. Now we are building an eighth 50-kilometer "strand". It will carry gas the shortest distance to the refinery. In short, production is becoming more complicated, and

this requires each worker to increase his responsibility for the task that he is assigned, to be aware of the need for discipline, and to know how to efficiently organize his work."

Viktor Malakhov, a machine operator and the secretary of the shop party organization, joins in the conversation. A labor veteran, who has worked in the field for many years, he knows people well and knows how to talk with them. When necessary he will find a cordial word and is a stern taskmaster when it comes to infractions. This is a militant and friendly party organization; the communists provide an example in all that they do, particularly in their actions. Grigoriy Adamov, a foreman, is such a person. Quite a few effective steps have been taken in his section. One of these steps is the use of a single-row lift instead of the usual two-row lift. The following fact, in particular, attests to the usefulness of this innovation. After the normalization of the lift, the low-yield well No 118 increased its output to 30 tons of oil every 24-hours.

The collective has done a good job: more than 3,000 tons of oil and 200 million cubic meters of natural gas have been extracted in excess of the plan. This is more than was called for by the socialist pledges. The quality indicators are high. But the collective still has considerable unused reserves and problems that have not been resolved.

I was acquainted with one of these problems in the geological department of the administration. For several years pulsed neutron-neutron logging data has been used to determine the residual oil saturation at the Peschanyy-Sea off-shore site. For example, the use of this method made it possible to discover the potential of the strata at wells No 308, 386 and 362, the total yield of which grew to 200 tons of oil every 24-hours. Altogether last year the execution of a set of geophysical operations at 23 wells has provided savings of state funds amounting to 500,000 rubles.

The chief geologist for the NGDU, Teymur Abdullayev, reports that "such opportunities exist at Bakhar. Unfortunately, we cannot get the work underway there because the geophysical office that provides us with service has only one instrument."

The attention of the administration's specialists is riveted on another problem: at present at the Bakhar deposit on one of the key beds - the formation of interruption - they are observing a fifty percent drop in formation pressure from what it had been initially. As a result all oil wells have already been switched to gas lift. But the "life" of the flow can be extended by starting to inject water into the productive strata. Efforts to introduce secondary recovery methods are already underway. At one of

scaffolding platforms they are building a pumping station and laying a water line. But, unfortunately, the construction of this project is not proceeding fast enough.

Bakhar is a difficult watch in the sea. Its well-being is in the reliable hands of the oil workers.

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CSO: 1822/336

## OIL AND GAS

### BIOTECHNOLOGY TO DOUSE FLARING

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 16 Aug 83 p 2

/Article by E. Kovalenko, senior scientific worker of the All-Union Petroleum and Gas Scientific-Research Institute and a candidate for the degree of doctor of technical sciences: "Biotechnology Will Put Out the Flares"/

/Text/ More than likely many of those who have visited oil fields or gas refineries have seen the smoking flares. This is by-product raw material burning.

Is this wasteful? Yes. But it is not so easy to eliminate it. As a rule, the designing and construction of compressor stations, gas refineries, and mainline interfield gas pipelines lag behind the time that oil and casing-head gas are extracted. And there are no major consumers of this valuable raw material nearby. A large number of specialists have worked and are now working to solve this problem; the most realistic conclusion is as follows: the development of temporary, mobile consumers. Their units must satisfy several requirements: be inexpensive so that they can be erected quickly and the process of refining the gas on the units must be simple. Thus, the mobile biotechnical unit for obtaining chlorella - a protein feed and a growth stimulant - is the best candidate for meeting all of these requirements. Agriculture is the consumer of this product in an almost unlimited amount. Protein feeds are particularly needed in the north, in the very locations where a large portion of the natural gas is being burned. The costs for transporting protein into the northern regions of Tyumen Oblast are about equal to the anticipated production cost of chlorella. But the capital investments for the biotechnical unit will be less than for the mainline inter-field gas pipeline and a compressor station.

It is necessary to point out that industrial experience of growing chlorella (using combustion gases, according to a design of VNIIBiotekhnika /All-Union Scientific-Research Institute of Biotechnology/) exists in Andizhan. But additional electricity from the network is needed for such an installation. But this is the

advantage of the mobile unit, which is to have its own independent power station. This means that the reliability of the power supply for the fields will not be reduced at all.

The biotechnical mobile unit that has been developed is placed in three to four arched pneumatic facilities measuring 12 by 36 meters. On this unit some 600 kilograms of petroleum associated gas yield one kilogram of a dry substance. In a period of one year the unit can produce 15 tons of dry protein.

It is important to note that the necessary equipment is standard for the food industry, with the exception of the tubular transparent reactors. The service life of the pneumatic coatings is five years. During this amount of time a compressor network and a gas refinery can be built. Then the biotechnical unit can be moved to a new location. In addition these units can produce liquid carbonic acid and fertilizers. This also helps to further lower the cost of product.

But, inspite of this, the realization of this method of utilizing the gas is running into many barriers. The oil workers do not want to finance the designing of the unit, believing that agricultural workers should do this.

This is a controversial position. After all the USSR Ministry of the Petroleum Industry has quite a few subsidiary farms and state farms, which do not have enough feed of their own. The workers of the oil industry's enterprises are to a large extent engaged in procurement. The additional outlays of labor for the production of chlorella will not exceed the outlays of work time for procuring livestock feed. In addition, the liquid carbonic acid, which is produced as a by-product on the units, is needed by those who are extracting the oil to increase the yield of oil strata in the deposits.

All of this suggests that the USSR Ministry of the Petroleum Industry should change its attitude toward the units for producing chlorella. It is possible that the matter could be moved along if the oil extraction enterprises were forced to decrease their profit by an amount equal to the cost of the gas that is being burned.

There is an opportunity to douse the flares in the oil fields, by no longer wasting this valuable by-product raw material, and to render substantial assistance to agriculture in the production of livestock feed.

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## OIL AND GAS

### REVIEW OF BOOK ON FORECASTING OIL AND GAS DEPOSITS

Baku VYSHKA in Russian 26 Aug 83 p 3

/Book review by S. Salayev, corresponding member of the Azerbaijan SSR Academy of Sciences, renowned scientist and professor: "On the Bookshelf: A New Step in Forecasting Oil and Gas Deposits"

/Text/ Today oil and gas account for 70 percent of the fuel and energy balance of the Soviet Union and the other industrialized nations. The level of extraction of these fuels is increasing from year to year.

This growth is being accomplished by the discovery of new deposits on the continents and in the waters surrounding them and by increasing the yield of the reservoirs at the known deposits. And growth is also maintained by searching for oil and gas at great depths. The problem of completing such deposits remains crucial for the world's oil industry.

Research in recent years shows that reservoirs with satisfactory capacity and filtration properties, which can accumulate liquid and gaseous hydrocarbons, are possible at great depths. The development and adoption of essentially new highly efficient methods of studying the properties of rock reservoirs help to increase the information content of geological-geophysical research and to substantiate the reliability of the results that are obtained. For this reason it is easy to understand the interest in the book recently published by the Baku scientists - professor L.A. Buryakovskiy and candidates for the degree of doctor of sciences I.S. Dzhafarov and R.D. Dzhavanshir. \*

Their book examines the theoretical bases for forecasting the physical properties of sedimentary rocks and formulates the principles for coming up with a substantive forecast. The book also brings together the new, highly-efficient methods, which substantially increase the information content of geological-geophysical research and much else.

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\* Forecasting the physical properties of reservoirs and caps of oil and gas. Moscow, Nedra, 1982.

Information concerning the physical properties of rock is needed at all stages in studying a deposit, starting with the planning for prospecting and ending with the actual development of the oil and gas deposits. In this book the authors have come up with a new approach to defining the parameters of the physical properties of rock. In essence this approach consists of obtaining analytical models of the influence of various natural factors upon the parameters of the physical properties and then massaging these models using a statistical testing (the Monte Carlo method) on a computer.

The book consists of three chapters that are linked together by a unified plan and intended to forecast the physical properties of the reservoirs and caps. The theoretical bases, the methodology and equipment used in forecasting the physical properties of rocks are analyzed in detail. The complicated questions having to do with the development of complicated methods for scientific-technical forecasting are examined in a logical sequence. The possibilities and restrictions of these methods in practice are demonstrated.

The fundamental principles of forecasting were formulated and the theoretical models of the properties and processes of the genesis of petrophysical formations were developed. A great deal of attention was given to the development of the methodological foundations and technology for forecasting the physical properties of reservoirs and caps of oil and gas deposits using a computer. The book comes with a full text of programs which make it possible to make extensive use of the offered methodology in the actual operations of scientific and production organizations.

The second chapter of the book deals with the preparation of the initial geological-geophysical and petrophysical data. It cites the results of a large body of experimental research on the rock reservoirs and clay caps. In this regard the study of rock properties is performed in actual atmospheric conditions and on installations which model the thermobarometric condition of the earth's interior. The analysis of the interconnections between the physical properties of the rock reservoirs was accomplished using modern mathematical methods.

An important feature of the book is the opportunity to make use of the described methodological approach in other physical-geological conditions. To do this it is necessary to make use of the experimental research and the rational rules for justifying the coefficients of the offered mathematical models.

In our opinion, the contents of the book could have been strengthened by making use of the offered methodology for forecasting other parameters of oil and gas deposits (the pressure of the pore liquid, the speed of the propagation of elastic waves, natural radioactivity, and so forth). It would also be useful to expand the

attention given to modeling corrections as the result of laboratory research on the physical properties of rock upon the influence of thermobarometric and structural-lithologic factors.

This book represents an original scientific research undertaking, which is noteworthy for its being easy to understand and for containing a lot of data, the results of which will find extensive use in actual operations.

Thus the publication of this book represents a new and important step toward describing the problem of forecasting the physical properties of rock on a solid theoretical basis using modern computers.

The book will be of interest to geologists and geophysicists who are engaged in prospecting for and developing oil and gas deposits in the various oil and gas regions of the USSR.

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## OIL AND GAS

### SYNOPSIS OF ARTICLES NEFTYANAYA I GAZOVAYA PROMYSHLENNOST'

Kiev NEFTYANAYA I GAZOVAYA PROMYSHLENNOST' in Russian No 3, Jul-Sep 83 pp 56-57

[Summaries of articles published in this issue]

[Text] UDC: 553.982.23.055:551.782.13(477.8)

Karpenchuk, Yu. R., and Pilipchuk, A. S., "Prospects for Discovery of New Gas Reservoirs in the Ciscarpathian Trough," NEFT. I GAZ. PROM-ST', No 3, 1983, pp 13-15.

A dense network of disjunctive dislocations (faults and fault-displacements) and structural peculiarities in the Lower Sarmathian sequence (interbedding of sand and clay varieties) have created the preconditions for the formation of fault-trap hydrocarbon reservoirs.

An area within the large Krakovetskiy fault zone (in its footwall) extending from the Novoselka area to the Opara area, where several gas reservoirs of this type have been discovered, is believed to be the most promising area in which to look for fault-trap hydrocarbon reservoirs. 2 illustrations.

UDC: 553.961.554(477.53)

Dem'yanchuk, O. V., "Oil and Gas Resources in the Axis-Adjacent Zone of the DDV," NEFT. I GAZ. PROM-ST', No 3, 1983, pp 12-13.

The author examines data on oil and gas resources of the Serpukhov-Upper Vise assemblage of the DDV, the productivity of which has been demonstrated in 76 deposits (the majority are associated with the axis-adjacent zone).

Geological-geophysical studies indicate the presence of structural forms and satisfactory reservoir properties of rocks at depths in excess of 5,000 meters, which is especially important when looking for hydrocarbon accumulations within the axis-adjacent zone. Bibliography: 4 titles.

UDC: 550.843.5

Chervonskiy, M. I.; Sagalova, Ye. I; and Sapuzhak, A. F., "Distribution of Average Velocity in a Sedimentary Sequence," NEFT. I GAZ. PROM-ST', No 3, 1983, pp 15-17.

The authors examine the possibilities of using maps of isochrones to for a more detailed study of the nature of distribution of average velocity in a sedimentary sequence. The proposed procedure of extrapolation of a time-depth curve below the bottom of core holes has been tested on the materials of the southwestern slope of the Eastern European Platform. 2 illustrations. 1 table. Bibliography: 4 items.

UDC: 551.24

Eminov, R. A., "Predicting Subsidence of the Earth's Surface in Oilfields," NEFT. I GAZ. PROM-ST', No 3, 1983, pp 18-21.

The author presents the mathematical edifice for constructing a regression equation on main components, with the aid of which formulas are obtained which reflect the relationship between subsidence of the earth's surface at oil-fields and man-caused factors. The author presents numerical values of rates of man-caused and tectonic movements of the earth's surface in the oilfields of the Apsheron Peninsula. It is now possible to predict earthquakes in oilfield areas.

It is also noted that water and air injection substantially slows the rate of subsidence and helps increase oil recovery from oil-bearing strata. The author points to the possibility of utilizing well cluster flow rate observations for the purpose of predicting earthquakes. 2 tables. Bibliography: 5 items.

UDC: 622.243.5.92

Ioanesyan, Yu. R.; Matsiyevskiy, V. P.; Simonyants, S. L.; and Petruk, N. V., "Rotary and Turbine Drilling Methods," NEFT. I GAZ. PROM-ST', No 3, 1983, pp 21-24.

The authors analyze the state of rotary drilling abroad and contemporary Soviet turbodrilling. The advantages and drawbacks of both methods are presented. The authors establish areas of efficient utilization of the rotary and turbine methods and describe future prospects for using turbodrills. Bibliography: 7 items.

UDC: 622.24.053.7

Sedov, V. A.; Yedeshko, L. N.; and Golovchenko, A. B., "Extending the Life of Drill Collars," NEFT. I GAZ. PROM-ST', No 3, 1983, pp 24-25.

The authors present the results of analysis of failure of drill collars (UBT) on the Yevpatoriya field deep drilling operation of the Krymgeologiya Production Association. The authors examine 37 cases of UBT breakage and plot a diagram of distribution of failures in relation to drilling depth. They establish that a depth of 2,000 meters is critical for UBT. A high frequency of

UBT failure at this depth is connected with the geological and technical-process conditions of drilling wells. To prevent UBT breakages, it is recommended when drilling through Upper Cretaceous beds that a Shock Sub be placed in the drill string. 2 illustrations. 1 table. Bibliography: 2 items.

UDC: 553.98:622.276.5(477.52)

Klyarovskiy, G. V.; Parakhin, B. G.; and Muzychko, I. I., "Test Production From Deep Strata," NEFT. I GAZ. PROM-ST', No 3, 1983, pp 30-32.

The authors briefly describe the geologic structure and oil and gas resources of the Anastas'yevskoye field, situated in the northern margin zone of the Dnieper Graben. The authors present a lithologic-physical description of producing-zone reservoirs and indicate the physicochemical properties of the fluids which saturate them. The authors analyze and synthesize materials on experimental-commercial production from deep oilfield zones and specify ways of further processing this material. 2 tables.

UDC: 622.323:541.182.43

Glushchenko, V. N., "Influence of the Composition of Aqueous Phase on the Properties of Invert Emulsions," NEFT. I GAZ. PROM-ST', No 3, 1983, pp 27-29.

The author shows that the qualitative composition of the aqueous phase of inverted emulsions is an important component for controlling their process parameters. With an increase in the concentration of electrolytes in the composition of the aqueous phase of inverted emulsions, one observes increased electrical stability, thermal stability, viscosity, static shear stress, clay content, and decreased filtration. Increasing the pH of mineralized aqueous phase produces decreased values of static shear stress, viscosity, and filtration of inverted emulsions, with increased electrical and thermal stability. 1 illustration. 3 tables. Bibliography: 5 items.

UDC: 621.438:62-757.42

Yeshchenko, A. I.; Ginzburg, Yu. A.; and Yakhnis, V. A., "Anti-Icing System of GTN-6 and GTN-16 Units," NEFT. I GAZ. PROM-ST', No 3, 1983, pp 51-53.

The authors examine gas turbine driven gas compressor units. They describe a thermal anti-icing system developed for GTN-6 and GTN-16 units. The authors present the results of a full-scale study of this system. 1 illustration. 1 table. Bibliography: 4 items.

UDC: 622.276.1/4.001.57

Buchkovskiy, S. S.; Boryshko, V. Ya.; and Yurasik, L. M., "Monitoring the State of the Injection Well Inventory," NEFT. I GAZ. PROM-ST', No 3, 1983, pp 38-39.

The authors present an analysis of the effectiveness of methods of treating injection wellbore-adjacent zones and discuss the objective causes of poor efficiency. To increase efficiency of treatment of injection well bottom-hole zones and to increase the effectiveness of the process of maintaining formation pressure, the authors propose a uniform system of bringing on line and monitoring the state of injection wells. 2 tables.

UDC: 622.692.4.07:338.984:001.89

Unigovskiy, L. M., and Topchiy, V. M., "Predicting the Performance of a Pipeline Spread," NEFT. I GAZ. PROM-ST', No 3, 1983, pp 46-49.

The authors examine an algorithm for predicting the performance of a spread building a trunk pipeline. They propose a probability method of predicting a schedule of performance of the principal types of pipeline construction jobs, based on processing incoming dispatcher information. 2 illustrations. Bibliography: 5 items.

UDC: 622.248.6

Kornilenko, M. A.; Timoshenko, V. I.; and Skorik, A. N., "Optimizing the Performance of a GUM Hydraulic Hammer," NEFT. I GAZ. PROM-ST', No 3, 1983, pp 26-27.

The authors present the results of adoption of a 2GUM162 hydraulic hammer for breaking drilling tools free in the Poltavneftegazgeologiya Association. They describe measures which make it possible to optimize hydraulic hammer performance. Bibliography: 2 items.

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3024

CSO: 1822/362

BRIEFS

ALI-BAYRAMLINSKIY DRILLING REPORT--Drillers from the Ali-Bayramlinskiy UBR /drilling administration/ have drilled the first 1,000 meters of rock in excess of the plan. In so doing they have completed the pledges that they made for the third year of the five-year plan ahead of schedule. It is significant that all 14 drilling brigades within the administration have completed their assignments; these organizations have already completed eleven wells in the oil and gas fields of the Prikurinskaya Lowland. This feat also exceeded planned targets. /Excerpts/ /Baku VYSHKA in Russian 1 Jun 83 p 1/ 8927

MORE INFORMATION ON ALI-BAYRAMLY--The pace of oil extraction is steadily increasing in the third year of the 11th Five-Year Plan, thanks to the efforts of the collective of the NGDU Shirvanneft. During the first six months the national economy received 5,500 tons of petroleum and nearly nine million cubic meters of natural gas in excess of the plan. This is almost double the amount planned initially by the petroleum workers. /Excerpts/ /Baku VYSHKA in Russian 16 Jul 83 p 1/ 8927

ALI-BAYRAMLY SUCCESS STORY--The design reference mark at development well No 1108, which is located in the Northern Kyurovdag deposit, has been reached three months ahead of scheduled drilling by the brigade headed by Alikram Gasanov, which is from the Ali-Bayramly UBR. Nearly 5,000 meters of steel shafts have been laid to the underground sources of natural fuel. This represents a 20 percent overfulfillment of the planned assignment. /Excerpts/ /Baku VYSHKA in Russian Aug 83 p 1/ 8927

FLARE DOUSED--Urengoy gas has reached the border of Perm Oblast and the Udmurt ASSR. The 434 kilometer stretch of difficult terrain, which was laid in the Western Urals, were yesterday put into operation. The festive meeting, which was devoted to this labor victory, was held in Chaykovskiy. The participants in the construction completed their work some six months ahead of schedule, which was established under a very tight schedule. /Excerpts/ /Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 5 Aug 83 p 1/ 8927

SARATOV USE OF WASTE GAS--At many industrial enterprises gas wastes are burned in flares. At the Oil Refinery imeni S.M. Kirov, the Production Association Nitron and the Saratov TETs-2 they have started to use gas wastes as a fuel. In the furnaces of the TETs-2 alone they have burned nearly 800,000 tons of the gas wastes over the past several years. As a result some 550,000 tons of scarce fuel oil have been conserved. The large detachment of local efficiency experts and inventors deserve a lot of credit for this accomplishment. /Text/ /Moscow PRAVDA in Russian 19 Aug 83 p 2/ 8927

BULLA-SEA OFFSHORE WELL--Well No 60 at the Bulla-Sea site is today producing 150 tons of condensate and nearly 600,000 cubic meters of natural gas every 24 hours. With the use of special equipment - flat-bottomed and tubular milling bits, overshots and so forth, testers from the sampling office of the Production Association Kasburneftegazprom /Caspian Sea Oil and Gas Drilling Organization/ were able to eliminate the collapsing of the steel casing string, replace the pipes that remained in the well and successfully undertake its development. /Excerpts/ /Baku VYSHKA in Russian 6 Aug 83 p 1/ 8927

BAKU OIL EXTRACTION REPORT--The collective of the NGDU imeni 26 Baku Commisars has reported that they have fulfilled their annual socialist pledges ahead of schedule. Within six months they have sent to the refineries nearly 2,000 tons of oil and almost 500,000 cubic meters of natural gas in excess of the plan. It is important to note that the diligent work of the oil field workers has stabilized the extraction of oil. The large number of measures that were taken to make maximum use of the extraction possibilities of the oil stratum helped to achieve this success. Since the start of the year, for example, some 12 wells, from which hundreds of tons of "black gold" have already been extracted, have been recovered. /Excerpts/ /Baku VYSHKA in Russian 13 Jul 83 p 1/ 8927

CSO: 1822/336

## COAL

### COAL TO PLAY MAJOR ROLE IN KAZAKHSTAN'S INDUSTRIAL FUTURE

Alma-Ata NARODNOYE KHOZYAYSTVO KAZAKHSTANA in Russian No 7, Jul 83 pp 9-13

[Article by A. Korkin, First Secretary of the Kazakhstan Communist Party's Karaganda Obkom: "Speed Up the Yield of the Karaganda Region's Capacity"]

[Text] "Increase the Kazakh SSR's industrial output by 22-25 percent. Continue to develop electric power, nonferrous and ferrous metallurgy, machinebuilding, the coal, chemical and petrochemical industries, light industry and the food industry. Bring the coal mined in 1985 up to 134 million tons, electric-power generation up to 90-95 billion kW-hr, and the output of finished rolled ferrous metals up to 5.1-5.3 million tons and of textiles up to 208-210 million square meters." (From the Main Directions for the Economic and Social Development of the USSR During 1981-1985 and During the Period up to 1990.)

Karaganda Oblast is by rights called a land of major industry. Thanks to the population's selfless labor and the unselfish fraternal assistance of our great motherland's peoples, a mighty industrial potential has been created here in past decades that exerts a pronounced influence on the whole republic's economic development.

Karaganda's glory is inseparably associated first of all with the coal basin. In level of mechanization of production processes and daily workload per mine and per longwall, it is one of the industry's leaders. Thus, 95.8 percent of all fuel mining is done at longwalls that have been mechanized in integrated fashion, and the tunneling of developmental workings with cutter loaders has reached 86 percent.

The basin is making ever wider use of a progressive room-and-pillar system for working seams, the share of which is 98 percent. Last year the miners sent up 48.9 million tons of coal, and it is planned to bring coal mining up to 50 million tons, including 32.6 million tons of coking coal, by the end of the five-year plan.

Coal reserves have been explored in detail basically to depths of 600 meters, in some areas to 800-900 meters. The basin can be developed further only

through exploration and the assimilation of deposits in the Karaganda and Ten-tek coal regions at depths below the technical limits of the floors of existing mines.

To the west of the basin, the Samarskoye and Zav'yalovskoye fields, which have large reserves of coal suitable for coking, have appeared. To the north the Kuu-Chek and Borly fields are being operated. The latter will, in the long term, yield 8 million tons of fuel per year, it is calculated.

The buildup of ferrous metallurgy is closely linked with development of the coal industry. The presence in Central Kazakhstan of coking coal and reserves of iron ore and other useful minerals has occasioned the forming of the Karaganda-Temirtau Regional Production Complex. The TPK's [regional production complex's] economy plans an important role in the republic's economy.

The base of the republic's ferrous metallurgy is the Karaganda Metallurgical Combine, with the cycle of production completed in the city of Temirtau. Kazakhstan's "Magnitka" is a specialized enterprise that supplies pig iron, steel, sheet and rolled stock, coke and products of the byproduct coke industry to the economy. Last year the metallurgists produced more than 4,761,000 tons of pig iron, 5,482,000 tons of steel and 4,297,000 tons of rolled metal. In December 1982 the first line of a complex for making 445,000 tons of tinplate per year was put into operation here. When its design capacity is fully assimilated, our country's production of plate for the canning industry will be doubled.

The raw materials base for the Karmetkombinat [Karaganda Metallurgical Combine] are the Zapadnyy Karazhal, Bol'shoy Ktay, Atasu, Lisakovsk and Kentyubinsk fields and the Alekseyev dolomite quarries. Fluxing limestone deposits are being excavated at the Yuzhno-Topar and Volynsk fields. The pace of the chemical industry--one of the promising branches of the TPK--is constantly being built up. It will be further developed on the basis of cooperation with the coal industry and ferrous metallurgy. This industry is represented in the area by Karbid, a huge production association. In addition to synthetic rubber, it produces calcium carbide, acetaldehyde, ethylacetate, acetic acid and other types of products.

Byproduct-coke industry production, which combines appropriate departments of Karmetkombinat, is a new branch of chemistry in the TPK. With the startup of these departments, the republic, in addition to coke, has, for the first time, started to produce nitrogen fertilizers, benzene, xylol and coal tar.

Such subsidiary and servicing industries as power engineering, machinebuilding and metalworking, building-materials production and woodworking, as well as light industry and the food industry, are being developed around the main industrial complex.

The oblast is a large producer of consumer goods. The Karagandaodezhda garment association, hosiery mill, footwear factory, Abayskaya Garment Factory and other enterprises of light industry and the food industry are producing and supplying the population with 45 percent of the republic's total output of hosiery, 19 percent of the garment items, 24 percent of the leather footwear,

the same amount of confectionery products and 55 percent of the margarine. The variety encompasses 2,000 items. Moreover, more than 1,200 other enterprises and organizations are connected with serving the public.

During the first 2 years of the 11th Five-Year Plan, the fixed production capital of enterprises and associations has risen by more than 302 million rubles, or by 6.5 percent, industrial production volume by 7.1 percent. The goals for producing the most important types of output were met.

The basic results of carrying out the oblast's plans for economic and social development in 1982 appear to be significant. Industrial production volume rose by 2.2 percent over 1981. The basin's miners produced 715,000 tons of coal above the program. In comparison with the preceding year, 15 underground mines increased fuel output, 16 increased tunneling volume and 12 percent increased labor productivity. The collective of section No 3 of the Shakhtinskaya Underground Mine, which is under N. I. Gladkikh and which on 25 December 1982 sent to the surface its millionth ton of coal from one longwall, achieved especially great success.

Enterprises of leading branches of the national economy were further developed. In particular, the petrochemical industry, where the rate of growth of production volume was 128.6 percent, developed at a rapid pace.

Much work is being done to reequip production facilities and to improve the quality of the output produced. Last year about 20,000 inventions and rationalizers' suggestions were introduced, with an economic benefit of 42.8 million rubles.

Definite results were also achieved in the drive to save material resources, raw materials and fuel and power resources. Expenditures per ruble of commodity output were reduced by 1.2 kopecks below 1981, which enabled 42 million rubles of commodity and material valuables to be saved. Last year the oblast saved 7,500 tons of rolled ferrous metal, 10,900 tons of cement, 7,900 cubic meters of lumber, 79,400 tons of standard fuel equivalent, 91.1 million kW-hr of electricity, 1,167 tons of diesel fuel and 3,763 tons of automotive gasoline.

Enterprises and organizations are doing much to speed up transfer to the new management rules. So, in recent years the oblast planning commission has been developing integrated regional plans for economic development and consolidate plans for the production of consumer goods and local building materials and for the construction of housing and municipal, cultural and domestic-amenity facilities.

More balanced planning is being introduced into capital construction. Many construction organizations have converted to supplying construction sites in accordance with the engineering designs, and the necessary work is being done to concentrate resources at facilities due for early startup and to improve the capital-investment structure. The mutually coordinated, approved development of a diversified economy under our oblast's circumstances requires the constant coordination of the activity of enterprises and organizations by the local soviets of people's deputies and their planning organs.

Drafts of the basic indicators for enterprises, associations, organizations and administrations are reviewed by the branch sections and the bureau of the obkom of the Kazakhstan Communist Party and at sessions of the oblast's ispolkom. After careful analysis of them, the party's obkom and the oblast's ispolkom send suggestions on various important questions of developing the economy to the appropriate Union and Union-republic ministries for review and possible decision.

Our largest reserve is a rise in the level of the utilization of fixed capital, on which, in the final analysis, the amounts of production, profit and profitability depend. This now occupies a central position in the work of party, soviet, trade-union and Komsomol organizations and of all economic managers.

It can be noted with satisfaction that the oblast is working purposefully to reduce idle time of people and equipment within shifts, and an accurate system for accounting for labor is being set up. Wherever idle time is still increasing for any reason whatsoever, the causes of what has happened are analyzed and steps taken to eliminate them. The certificate of equipment utilization effectiveness is being introduced in accordance with the Rostovites' experience.

Party organizations are strengthening their monitoring of the economic activity of enterprises; well thought out, validated requisitions for new equipment are being prepared; and the deadlines for delivery and rapid introduction of the equipment into operation are being observed.

During the 11th Five-Year Plan measures have been developed to reduce manual labor. They are aimed primarily at accelerating the mechanization of labor-intensive operations and at raising productivity. In all, it is proposed to execute 2,584 such measures during the five-year plan. Doing so will enable the labor of 25,000 workers to be mechanized and facilitated and more than 8,000 people to be provisionally released.

The drive for an acceleration of scientific and technical progress and for raising labor productivity still acquires special urgency because during the 11th Five-Year Plan production volume should be increased basically without increasing worker manning. Therefore, we are advancing the question of improving labor-resources utilization to first priority. The solution of this question will greatly help the workers' creative initiatives and progressive forms and methods for organizing labor.

An obvious example of this is the rolling-mill operators' brigade of rolled-sheet department No 2 of Karmetkombinat, which is under delegate to the 26th CPSU Congress, deputy of the Supreme Soviet of the Kazakh SSR, USSR State Prize winner Communist S. V. Drozhzhin. At the start of the five-year plan it undertook the initiative, "For high yield of labor at each workplace!" The initiative was approved by the Kazakhstan Communist Party Central Committee. In 1982, 8 metallurgical enterprises, 93 departments and sections and 723 brigades--embracing a total of 19,700 workers--operated in accordance with the example of Drozhzhin's brigade.

Right now there are several times as many followers of S. V. Drozhzhin's brigade. Their initiative has received wide propagation and support at enterprises of other branches of the national economy, particularly at Karagandau-gol' Association underground mines, and it has been made the basis for the organization of operations during the erection of facilities for industrial, social and cultural purposes. The builders have gone even farther--they have also introduced the start-to-finish flow-line contract method. Thanks to this, the most complicated technical and organizational questions about the erection of such a specially built facility as the tinplate department of Kazakhstan's Magnitka have been solved responsively. The new method is being widely used during construction of the second line of a cement plant, a bread and macaroni factory, schools and other facilities.

At the Karaganda Industrial Rubber-Products Plant, the initiative of A. N. Ras-strygin's brigade, "The 11th Five-Year Plan--in 4 years," is being widely supported. The brigade-contract method, under which about 640 low-level col-lectives are now operating, is being propagated widely in capital construc-tion. The wage that takes the coefficient of labor participation into account has been spread to more than 500 brigades. All this, in the final analysis, leads to growth in labor productivity and to the improvement of other technical and economic indicators.

The oblast's enterprises and organizations are attributing exceptionally great importance to raising output quality. As a result, last year alone 330 mil-lion rubles' worth of articles of the highest quality category were produced--1.8-fold more than in 1980.

At the Karaganda Metallurgical Combine a substantial portion of the output is certified for the first and the highest quality categories, and tens of types of items have been awarded the State Emblem of Quality. The total amount of output of high-quality was brought up to 15.5 percent.

In brief, much has been done for dynamic development of the oblast's economy. But much more still remains to be done to carry out fully the decisions of the 26th CPSU Congress and the 15th Kazakhstan Communist Party Congress. This re-fers primarily to further development of the coal basin.

With the transfer of the mine workers to deeper horizons, mine geology and mine-engineering conditions have become greatly complicated. This has sharply increased the labor intensiveness of production processes and affected negatively the pace of the mining work.

One of the causes of the strain that has been created in the basin is the inadequacy of breakage-face lines, which has occurred because of the lag in the construction of new mines and horizons. At present 12 coal enterprises are working at horizons whose creation has not been completed. Unfortunately, it is impossible to eliminate during the current five-year plan the situation that has prevailed. The fact is that the USSR Ministry of Coal Industry has allocated for this purpose 65 million rubles less than is required.

Lateness in introducing new longwalls and the low effectiveness of their oper-ation have been caused by inadequate provisioning of underground mines with

mechanized longwall-mining machines and spare parts for them, and also by the unsuitability of various long-wall mining machines--OKP-70, MK-75 and IMKM--for work under complicated conditions.

Effective means for mechanizing tunneling operations and for excavating the thin seams of the Dolinsk suite are lacking. The Karagandaugol' Association is experiencing severe shortages of rolled metal for mine-working supports.

The time has also come when housing must be built. In Karaganda alone housing totaling more than 1 million square meters in area is located in areas under which coal has been mined. This problem is complicated still more by the fact that USSR Minugleprom has not given the Karagandaugol' Association funds for 255,000 square meters of housing, or almost a third of the amount of housing space called for by the plan for the 11th Five-Year Plan.

There are many bottlenecks also in development of the standard bearer of Kazakhstan's ferrous metallurgy--the Karaganda Metallurgical Combine. One of the main points here is the question of providing it with raw material. The combine's main iron-ore base is still the Lisakovsk field of limonite. But the trouble is that Lisakovsk ore has an increased phosphorus content and an inadequately high percent of iron.

It is possible to overcome the difficulties and to solve the problem that has arisen mainly by the magnetic and sintering scheme for ore enrichment, which enables the iron content of the concentrate to be raised. It is also planned to introduce into operation the Ken-Tyube field and a concentrating plant. This will provide the combine with a supply of concentrate in which the iron content will reach 66 percent.

A topic of tireless attention and concern to the party obkom is the construction and the buildup of the collective of the Karaganda Industrial Rubber Products Plant imeni Leninskiy Komsomol Kazakhstana. It is among the country's largest enterprises. Already, 121 million rubles of capital investment have been assimilated in its construction. But, unfortunately, disproportions have prevailed here between the construction and the introduction into operation of production capacity and auxiliary services, housing and facilities for cultural and domestic-amenities purposes.

The design institutes erred in their calculations for supplying the plant with thermal energy, water and treatment facilities. Calculations indicate that about 35 million additional rubles are needed for development of the water and power activities and the repair base.

The question of building facilities for social, domestic-amenity and cultural purposes and of putting them into operation remains especially great. Suffice it to say that only 18 million of the 30 million rubles necessary for these purposes have been allocated during the current five-year plan.

It is to be hoped that the leaders of the republic's ministries and agencies will pay tireless attention to all this, look carefully into the questions that are bothering us today, and help the Karaganda Oblast party organization to solve these large, responsible tasks that the party and the government face.

We are contemplating major, strenuous plans. By the end of the current five-year plan the oblast's industrial output volume should be 3.9 billion rubles, an increase of 19.1 percent over 1980. In order to accomplish this task successfully, branches of the production infrastructure should be established at an accelerated rate on the grounds of the Karaganda-Temirtau TPK. We have in mind primarily heat and electric-power generation, capital construction and transport, as well as servicing and subsidiary branches of industry, with assurance of their proper development at each stage, appropriate balances as to capacity and labor, and synchronism in the introduction of facilities.

The Karaganda Coal Basin is being preserved as one of the main bases for mining coking coal for the metallurgical industries of Kazakhstan and the Urals. Its development should, on the whole, provide for a 13.6 percent growth in production output volume by the end of the five-year plan. Electrical generation is to be brought up to 11.7 billion kW-hr.

Ferrous metallurgy, petrochemicals, light industry, the food industry and other branches of industry are to be further developed.

Consumer goods will rise by 13.4 percent in production volume, to 746.6 million rubles. More than 700 new models and types of products will be mastered. Production of goods of the highest quality category will be increased 1.5-fold, to about 60 million rubles' worth. Fixed capital of 2.9 billion rubles will be put into operation.

Major resources are also being applied to the development of public education and medical, municipal and domestic services for the public--in brief, of everything that a person needs for highly productive labor and good recreation. All the problems are being resolved in unison.

The oblast's party, soviet and social organizations and workers, like all Soviet people, are actively including themselves in the drive to implement the decisions of the November 1982 and July 1983 CPSU Central Committee Plenums and the instructions of CPSU Central Committee General Secretary Comrade Yu. V. Andropov that were contained in his speech at the plenums and statements made during a meeting with Moscow machine-toolmakers.

Measures were worked out at meetings of the oblast's party and economic activists and then at plenums of the party's obkom on strengthening in lower level organizations the state of organizational and mass political work that is aimed at strengthening labor and production discipline and at further raising production effectiveness.

The task has been set at each enterprise and organization and at each work place of creating those conditions that will stimulate high-quality and productive labor and will indoctrinate people in a sense of efficiency, high responsibility for the assigned job, and socialist enterprisingness.

In developing the workers' initiative and striving to work still better, the party's obkom and the oblast's primary party organizations are aiming all their efforts at successful execution of the decisions of the 26th CPSU Congress and the 15th Communist Party of Kazakhstan Congress on unconditional fulfillment of 11th Five-Year Plan period plans.

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## COAL

### COAL INDUSTRY PROGRESS SURVEYED

Moscow EKONOMICHESKAYA GAZETA in Russian No 7, Feb 83 p4

[Article by I. Ivanov: "Coal"]

[Text] The coal industry in general fulfilled the January plan. Compared to the same month last year coal and shale extraction increased by 136,000 tons, and deliveries of coking coal for metallurgical purposes grew by 144,000 tons.

Coal extraction by surface mining methods is continuing to develop, growing by 684,000 tons. Its greatest growth -- by 300,000 tons -- was in the Kansk-Achinsk Basin. However, the target for coal extraction by these progressive methods remains unfulfilled due to the lagging of strip mines in a number of basins.

Workers at 13 progressive collectives are initiators of competition to fulfill the plan for the third year of the five-year plan ahead of time. They have extracted more than 200,000 tons of coal beyond the monthly plans and have improved labor productivity and other techno-economic indicators. Good results were obtained by the following production associations: Donetskugol' [Donets Coal], Krasnoyarskugol', Krasnoarmeyskugol', Yuzhkuzbassugol', Shakhterskantratsit and a number of others.

At the same time 14 production associations out of 54 are lagging and have not met coal extraction targets. They include: Ekibastuzugol', Leninskugol' (Kuzbass), Selidovugol' and Stakhanovugol' (Donbass).

The general level of coal extraction reached by the USSR Ministry of the Coal Industry is insufficient. Many associations did not ensure the fulfillment of the annual plan. In January the sector's work was very uneven and unrhythmic.

There are also other factors hindering the coal industry's development. In January there was somewhat of an improvement in railroad car delivery for coal loading. However, in a number of basins the fuel shipment situation continues to remain tight. As previously, miners in the Ekibastuz and Karaganda Basins and especially in the Kuzbass are making serious complaints to railroad workers.

## COAL

### OFFICIALS AT STANDARDIZATION CENTER COMPLAIN ABOUT COAL QUALITY

Moscow EKONIMICHESKAYA GAZETA in Russian No 23, Jun 83 p 9

[Article by O. Yekatova, deputy director Karaganda Center for Standardization and Metrology, A. Tashmukhambetova, engineer: "What Dissatisfies Coal Users"]

[Text] In organizing fuel extraction at mines of the Karagandaugol' Production Association (General Director N. Drizhd) they annually ratify and implement a complex of measures to improve the technology of removal work, guarantee the strict observation of standards and technical conditions, meet the requirements in the ratings for longwall supports, etc. Progressive methods of beneficiation are being introduced at coal preparation facilities.

Nevertheless, the quality of coal delivered to customers is often still low. About 30 percent of the fuel checked in the first quarter by associates at the Karaganda Center for Standardization and Metrology did not meet GOSTs [State Standards] for ash content and other indicators. Technological discipline has been infringed upon at the Mine imeni Kuzembayev. During cave-ins ordinary rock has been mixed with coking coal, causing it to lose its valuable properties. The Karaganda Metallurgical Combine has received low quality fuel from this mine, hindering the work of its coke and chemical production operations.

Coal not meeting the requirements of standards with regard to mineral impurities and ash content is sent to customers from the Kirovskaya and Severnaya Mines. In particular, at the Kirovskaya Mine a stroke of the pen has reduced the mineral content of coal recorded in indicator documents 1.5 - 2 fold below the actual levels. Here they also permit the loading of very moist coal. During winter transportation it freezes in the freight cars, with all the ensuing consequences. Many censures are addressed to the Kuu-Chekinskiy coal strip mine -- one of the largest suppliers of power generation coal. The enterprise's managers "forget" about elementary quality requirements contained in the standards. As they are not observing the proper conditions for stripping and extracting operations, coal ash content exceeds the permissible norms. A number of mines are still violating technical rules and loading nonstandard output. Economic sanctions should be used against them, but these do not always help.

One of the causes of this is the weakness of the work done by departments of technical control. Often they give unreliable evaluations of quality. For example, in our checks the ash content of various samples of Kuu-Chekinskiy mine coal exceeded 50 percent, while according to department of technical

control is was 41 percent. The work of the underground control service at the Mine imeni Kuzembayev has also been determined to be unsatisfactory.

The majority of these enterprises are successfully meeting planned targets, but only for the amount of coal shipped.

Mines and pits in Karaganda are having difficulties in forcing their way through the comprehensive system for managing product quality [KSUKP]. The KSUKP has been mastered only by the collective of the Saranskaya Group Concentration Facility (GOF). Work in this direction is going very slowly at other enterprises. The association has still not implemented measures to increase the production of coal in the higher quality categories. So far this right has only been awarded to coke concentrate from the Saranskaya GOF.

11,574

CSO: 1822/343

## COAL

### ROOF SUPPORT STACKING EQUIPMENT DESIGNED BUT NOT MANUFACTURED

Moscow PRAVDA in Russian 3 Aug 83 p 2

[Article by V. Cherkasov: "Who Will Help the Miners?"]

[Text] Anybody who has gone down into a shaft or mine knows that supporting the roof with modular metal roof supports is a heavy job. Back in 1972 the Scientific Research Institute of UkSSR Ministry of Ferrous Metallurgy in Krivoy Rog and Mintyazhmash's [Ministry of Heavy and Transport Machine Building] NIPi-gormash [Scientific Research and Planning Institute for Mining Machinery] designed the KP-1 suspended roof support stacker to mechanize roof support in horizontal tunnels using pliable mechanized supports.

An industrial model was successfully tested at the Saksagan' Mine in Krivoy Rog and an interdepartmental commission recommended its series production. More than 10 years have passed and the miners have still not received the unit.

Seemingly hopeful new technical solutions to this "age old" problem have appeared. Joining together, enthusiasts from institutes have made experimental models of the machines. They successfully underwent testing at mines in the Krivoy Rog area, were demonstrated at the VDNKh SSSR [Exhibition of Achievements of the National Economy of the USSR] and at the international exposition, Coal-75. The innovations are protected by a series of patents and the inventors, N. Samoylenko and V. Zaslov have defended candidates dissertations. It would seem that underground workers would not have to still be concerned about support for mining excavations. What is more, Mintyazhmash entrusted the equipment's manufacture to the Cheremkhovo machine building plant. The inventors only have to confirm the successful research with the development of new technology, something for which Ukrainian Gosplan allocated resources in 1980.

Thus, it would seem that the valuable inventions have been placed on a firm foundation: a departmental institute of UkSSR Minchermet was entrusted with the development of the new technology; and the NIPi-gormash in Sverdlovsk with preparing the Cheremkhovo machinery plant for series production of the item. However, due to lack of departmental coordination and of timely control over the implementation of the decisions made, the good intentions remain on paper.

Miners, not believing the promises, have now become involved in the development of roof support stackers. In the Krivo Rog Basin I was shown homemade models

at the mines imeni Dzerzhinskiy and imeni Karl Libknekht made by skilled workers. With their help there are attempts here to lessen the labor of roof support workers.

It is known how acute the problem of key worker shortages is at mines. This is due to their still being a lot of manual labor here. However, as is seen, for many years workers at Soyuzgormash [Possibly: All-Union Mining Machinery] have not been able to start up production of machinery which has already been designed. It turns out that there is a huge distance from an idea's birth to its actual embodiment. Isn't it time to shorten it?

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CSO: 1822/342

## COAL

### EXCAVATOR REPAIR PROBLEMS HINDER EAST SIBERIAN MINES

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 4 Aug 83 p 2]

[Article by P. Len', correspondent, VOSTOCHNO-SIBIRSKAYA PRAVDA, Irkutsk: "Tripping up the Walking Excavator"]

[Text] Having calculated that about one out of four walking excavators were not meeting the plan, East Siberian coal miners were startled. On the one hand the Vostsibugol" [East Siberian Coal] Association is considered one of the sector's progressive units, while on the other, it is short thousands of tons of coal, which could provide a solid makeweight to the plan. Just what is the problem? There has been an expanded meeting of directors and territorial committees of trade unions and trips have been made to the USSR Ministry of the Coal Industry.

Who will get the East Siberian walking excavators in motion? Two years ago the USSR Committee of People's Control noted that at some enterprises extra-plan idle time of mining equipment reached 17 percent. There are also violations of work rules, bad roads and weak technical discipline here. However, the main reason, one which has not been straightened out two years after the review, is the low quality of repairs on the walking giants.

The complicated thousand ton machines, which entered the nation's coal pits thirty years ago, are in need of repairs. However, while the many thousand strong collectives at the Urals and Novokramatorsk plants work at building them, their repair has been entrusted to the Cheremkhovo Machine Shop, for example. It was built back in the war years to repair mining equipment. When there were not many excavators, one or two were repaired annually, and this with great difficulty. Back in the early 1970's it suddenly occurred to the USSR Ministry of the Coal Industry that the mining giants were not being repaired by the weak Cheremkhovo and Svirsk repair shops. The experience, and even the errors in East Siberia should have been the basis for further movement into the Siberian coal regions, where the time had come to develop the reserves of KATEK [Kansk-Achinsk Fuel and Energy Complex] and southern Yakutia.

"As a result, it turns out that the hours and minutes which we save during work in the pits are lost and transformed into months lost during scheduled repairs." Said N. Konovalov, deputy to the RSFSR Supreme Soviet and a well known machine operator. "A generator engine to one of the excavators on which I worked was sent to the plant 13 times. Each such operation is a long halt, "stolen" from

the days allocated to planned-preventive repair. Even with such stops our crew achieved good results. However, if it hadn't been for them we could have easily passed the four million mark...."

Depending upon the type of machine, it might take a month or half a year to "cure" an excavator. Repair preparations are carried out ahead of time: defect reports are compiled, spare parts acquired and a site prepared. Long before the stop, experienced crews are also involved in repair preparations. Here are the thoughts of Aleksey Plynskiy, winner of the USSR State Prize and crew leader from a 20 cubic year giant at the Azeyskiy coal strip mine:

"At the beginning of repairs the main performer -- the ore repair plant -- did not have half of the required spare parts. Neither was Vostsibenergougol' [East Siberian Energy and Coal], located hundreds of kilometers from the excavator, able to become operationally involved in startup and adjustment work."

Plynskiy's excavator was a month late in undergoing repairs. The machine's second birth cost more than 1 million rubles and it was idle more than 40 extra days. At one of the leading strip mines at "Safronovskiy" excessive equipment idle time for repairs amounted to almost 100 days. Today it has passed that mark: 123 days! Electrical equipment, loading-transport and lift machinery are in short supply. During the repairs on Plynskiy's excavator it was necessary to take another machine, a 40 cubic meter excavator, out of operation and use it as a lifting crane! Machine builders have still not created lift devices with the needed capacity, it appears.

Coal miners at Tulun, towards which the center of East Siberian coal extraction is shifting, have special problems with repairs. Dozens of people are constantly on "official trips" here. People on temporary repair work also behave like time-servers. There is no base and every item must be hauled in from far away. The conclusions: it is necessary to have a new repair facility and to rebuild old repair enterprises, bringing them to the coal extraction sites. So far there has been no success in obtaining techno-economic feasibility studies on erecting the essential facilities from Uralgiprosnakht.

More immediate goals are often behind concerns about such strategically important tasks. For example, only the coal mine suffers losses from bad repairs. What about the repair workers? Every year contracts are signed here. Each party assumes definite obligations and the machines to be repaired are specified. If repairs are not completed counter claims should be made. Although both parties violate the contract terms, nobody has to pay out rubles as they don't want to damage their relationship.

V. Pankov, an experienced machine operator, states: "It is necessary to sign a cooperation agreement for each individual machine and in cases of violations analyze the causes and prevent things from getting out of hand. Sometimes components are removed from machines under repair and hauled over to the working face to straighten out emergencies at operating machines. A contract for each machine would eliminate such liberties."

A machine is ready for repairs, but Vostsibenergougol' is in no hurry to begin work. It waits and puts things off until a later day. Then adjustment workers

arrive and mine repair workers beseech -- put in a greater effort. They in turn respond: assist us and give us moral incentives. When one considers that there are now up to seven excavators under repairs each year, then an entire coal miner brigade is removed from work.

Yu. Chemesov, an honored miner of the RSFSR feels that this dampens the enthusiasm of managers and workers, eliminates initiative and creative searches, slows down repairs and reduces quality. His brigade has repeatedly retained auxiliary workers for repair work. He sees the following solution. The mine repair plant has created four comprehensive brigades to rebuild large machinery. Not all of them work equally well, but this kind of work organization is justified. The proper path has been chosen. During repair work the comprehensive brigades should combine their moral and material incentives with those of adjustment and plant workers. Working in a unified manner they will not stretch out repairs in various ways. However, this progressive operation is not yet well organized.

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CSO: 1822/342

## COAL

### DON COAL PROGRESS SURVEYED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 1 Apr 83 p 1

[Article by V. Uzhakin: "Successes of the Don Miners"]

[Text] Since the beginning of the 11th Five-Year Plan Don miners have produced 1.5 million tons of anthracite above the plan. This includes more than 300,000 tons in the first quarter of this year.

At the Mine imeni 50 Years of October in Gukovo I met the well known brigade leader and million tonner, Hero of Socialist Labor and delegate to the 26th CPSU Congress K. Markelov. Since the beginning of the year his brigade has dug more than 20,000 tons of coal in addition to its obligations. This is the best result for extraction brigades in the Don.

The brigade leader said that the work is going well. He had visited the first repair shift. The young workers have put the machinery into model order, straightened things out quickly and have not been waiting around for the cleaning workers to arrive. They have cut into the face and produced 500 tons of coal prior to the arrival of the extraction shift. They have a serious attitude and the load at the longwall is growing. Compared to last year the average extraction per day has increased 250 tons and has reached 3,290 tons. This is more than needed to produce 1 million tons per year. But, as is known, reserves cannot be taken out of your pocket.

Increasing rates are characteristic of all extraction brigades at the Mine imeni 50 Years of October. For results in jubilee competition in honor of the 60th Year of the Formation of the USSR this mine was awarded the Red Challenge Banner of the CPSU Central Committee the USSR Council of Ministers the AUCCTU and the Komsomol Central Committee. Thus, throughout all of last year the brigades of V. Kaptsov and V. Albatov were only able to overfull their obligations by 1,000 tons, while in less than 1 quarter of this year they have an extra 3,000 - 5,000 tons.

In the Don everybody is striving to be an example of progressive workers. Take the new Mine imeni 60 Years of the Leninist Komsomol. At one time everybody here felt that the 1,000 ton loading mark was unattainable, but they were able to mobilize the brigades of V. Frolov and V. Kuzmen'kov, make use of reserves and it became possible to produce 1,000 and more tons of coal per day.

V. Pyatakov's brigade from the Mirnoye Mining Administration is among the leaders in the competition for work without lagging. Since the beginning of the year it has accounted for more than 10,000 tons of coal above its obligations. The brigade of N. Gubin at the Gukovskaya Mine and of L. Prokopov from the Glubokaya are working on the same tight schedule.

M. Sadokov, deputy chief of the Coal Industry Department at the Rostov Obkom says that the oblast already has 20 brigades which have produced 1,000 tons daily. They account for more than half of above-plan extraction. At the same time one should direct attention towards generally raising the standards of mine work organization. This is the only reason that work has been stabilized at mines such as the Zapadnaya-Kapital'naya and Ayutinskaya, which have produced an additional 20,000 - 30,000 tons of fuel each. Previously, tunnel driving operations were not in good shape everywhere; they were lagging. They created consolidated tunnel driving brigades and supplied them with more reliable equipment. The tunnel drivers have pulled themselves together.

The brigade of Hero of Socialist Labor V. Safronov at the Vostochnaya Mine sets the tone in competition. In 2 months it dug 596 meters of tunnels, while its obligations were only 330 meters. The tunnel driving brigades of V. Chechevichkin at the Burgustinskoye Mine Administration and of USSR State Prize Winner N. Petrenko from the Mine imeni 50 Years of October could be called genuine high speed underground workers. This is also shown in the work of breakage face crews.

They move forward in a unified front, from success to success. The miners are increasing their labor honors every day and with every shift worked.

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CSO: 1822/343

COAL

## OLD MINE IN DONBASS UPGRADED

Moscow SOTSIALISTICHESKAYA INDUSTRIYA 18 Mar 83 p 1

[Article by B. Gertsenov, TASS correspondent: "New Life for a Mine"]

[Text] The Kolodnaya Balka mine, which had been threatened with closure "due to age" has returned to being one of the better mines in the Donbass. Since the beginning of the five-year plan it has brought up 200,000 tons of coal in addition to the plan.

The second life of the mine, which had worked out the reserves allocated to it is due to farsighted engineering and economic initiative. When there was enough coal left in the mine for a few years of work the question arose: where should people be moved in the future and how can well established settlements be better made use of? The enterprise management proposed making use of so-called unconditioned seams which were thin, and developing a new coal field lying nearby.

Old sections of the coal field experienced new life. Enthusiasts are persistently "storming" the deposits here, which had long ago been written off as unconditioned because of thinness. Together with specialists from the Donetsk Scientific Research Institute for Coal, engineers at the Kholodnaya Balka Mine developed economically beneficial technology for extracting coal from seams only one-half meter thick. They improved a series produced scraper-cutter adapting it for the tight spaces of thin longwalls, extraction and transportation of coal.

F. Shteby's brigade became pioneers in this new work. Its experience was acquired by the collectives of S. Gayduchenko and N. Duboviy. Now each of them is sending up 140-150 tons of coal, something which nobody would have reckoned upon up until quite recently.

This initiative by the enterprise managers, supported by the work collective has enabled the mine to attain and secure high coal extraction levels. The Kholodnaya Balka, the reserves of which were on the way out, will serve the Donbass another two decades.

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CSO: 1822/343

## COAL

### KHARANOR MINE PRODUCTION FIGURES

Moscow IZVESTIYA in Russian 8 Aug 83 p 1

[Article by A. Kleva, special correspondent: "The Dauria Coal Moves"]

[Text] By the end of the five-Year Plan the Kharanor coal strip mine will deliver power producers in the Far East and East Siberia 9 million tons of coal. This is 1.5 fold greater than its present capacity.

The strip mine is a comparatively young enterprise extracting brown coal from the Dauriskaya Steppe in the Trans-Baykal, but it has great promise -- by 1990 it will produce 17.4 million tons.

B. Borodin, the director, states: "As a matter of fact, another strip mine with considerably greater capacity than the existing one should have been introduced. After all, our planned capacity was "only" 3 million tons annually. We decided to increase extraction primarily through technical modernization and the expansion of sections. We were concerned about improving miners' social and living conditions. The extensive use of new technology has made it possible to double planned productivity. We were the first in East Siberia to put rotary bucket excavators into operation."

Now assembly work is being completed on yet another rotary giant here. It is going into operation on 1 September in order to increase the winter flow of fuel. Next are dozens of other powerful machines, including walking excavators. However, the time had come when work was under way on the entire extraction front. There were no great reserves here, it seemed.

Nevertheless, they were found. It was decided to use a second, unworked side of the mine. This section will produce another 3 million tons of coal. In Kharanor they are also systematically searching for and developing new forms of production ties. Since the beginning of the year two consolidated brigades have been created. They are led by A. Mayborod and A. Tarasenko.

The progressive work organization and personal skills of the consolidated brigade leaders has increased coal extraction by 600 tons and an additional 70 levels since the start of the year. Stripping and water removal work is equally successful, plant operations are being expanded and production and residential projects and electric power lines are being built.

COAL

#### SPARE PARTS SHORTAGES NOTED AT EKIBASTUZ

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 11 Jun 83 p 1

[Article by P. Onopriyenko: "A New Schedule -- An Old Approach"]

[Text] At the Ekibastuzgol' [Ekibastuz Coal] Association's Bogatyr' Strip Mine the brigade of Vladimir Mukishev should extract 3 million tons of coal this year. However, the SRS(K)-2000 No 46 rotary bucket excavator, upon which the extraction plans depend, is still at the assembly site.

The mechanical part of the excavator is 98 percent complete. Only a little bit remains to be done, but for several months now miners and assemblers have not been able to complete the work.

At the Ekibastuzgol' Association they very freely dispose of parts and components arriving for the new excavators. The rotor shell of one of the machines operating at the Bogatyr' broke down. Without thinking too long about the fine points, they took a new one from the No 46 excavator being assembled. An electric motor for the rotor drive was removed for another machine; while the rotor wheel and two reducer gears were taken off for a third. True, an old rotor shell which had been repaired was brought to the assembly site, but it is not suitable, because the new machine has been modernized. Adding to everything, the customer, the board of directors of the Ekibastuzgol' Association, did not ensure the delivery of more than 6 kilometers of power cable.

The customer is clearly in no rush to complete installation and nobody is supervising the implementation of the changed schedule. The installation site is already receiving equipment for rotor complexes intended for the Vostochniy Strip mine now under construction, the first section of which is to start up next year. The collective of the recently created strip mine construction administration of the Kazpromtekhmontazh [Kazakh Industrial Technical Installation] Trust is supposed to assemble the following for the Vostochnyy Mine: 5 SRS(K)-2000 excavators, 5 reloaders and 18 cable transfer devices.

The assembly of the first two excavators is under way. However, the assemblers are working under difficult conditions. There is nowhere to store the arriving equipment -- around 1,100 tons have already arrived -- brand new parts and

components frequently lie directly in the dirt. In order to work rapidly, assemblers need 8 specially equipped sites; there are only 3. The general contractor -- the Ekibastushakhtostroy [Ekibastuz Mine Construction] combine -- has not yet begun to build the remaining sites. The energy supply system has not been rebuilt, although the schedule was approved long ago. Therefore assembly worker brigades stand idle for several hours every day due to interruptions in electricity supplies.

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CSO: 1822/342

## OTHER SOLID FUELS

### SYNOPSIS OF ARTICLES TORFYANAYA PROMYSHLENNOST'

Moscow TORFYANAYA PROMYSHLENNOST' in Russian No 5, May 83 p 32

/Text/

UDC 622.331:658.387.4

A. V. Dragun, "Operational Experience of Production Brigades on a Standardized Contract," TORFYANAYA PROMYSHLENNOST', 1983, No 5, pp 8-10.

Examined here are the problems of utilizing the coefficients of labor participation in distributing the total brigade wages among the brigade members.

UDC 622.331.002.5:621-1

V. G. Alekseyev, "Quantitative Requirements for the Reliability of Machinery in Engineering Complexes," TORFYANAYA PROMYSHLENNOST', 1983, No 5, pp 16-18.

Obtained here is a formula for calculating the requirements for the reliability of machinery at each operation of the engineering process of extracting peat. Methods are cited for applying the formulas obtained.

Contains 2 illustrations and a bibliography with 2 titles.

UDC 629.1.032

A. P. Kulyashov, L. S. Levshunov, V. I. Markus, "Comparative Evaluation of All-Purpose Transport Means under conditions of Swampy Localities," TORFYANAYA PROMYSHLENNOST', 1983, No 5, pp 19-20.

Analysis is conducted here of various engines of transport means from the viewpoint of ensuring the best vehicle mobility over soils with a low bearing capacity. The rotor-screw-type engine is examined in detail.

Contains 2 illustrations and a bibliography with 2 titles.

UDC 622.331:622.232

A. A. Svirko, V. T. Polyankov, "Studying the Technical Indicators of Extracting Lump-Type Peat by means of the NTK Machine," TORFYANAYA PROMYSHLENNOST', 1983, No 5, pp 20-22.

Cited here are the results of studies made on the technical indicators of extracting lump-type peat by means of the NTK machine on deposits with various qualitative characteristics.

Contains 1 illustration and 1 table.

UDC 622.331.626.861.002.5

Yu. V. Krasnov, V. A. Sudarikov, Ye. A. Bodryashov, "Mechanization of Repairs on Conducting Canals," TORFYANAYA PROMYSHLENNOST', 1983, No 5, pp 22-23.

Set forth here are basic data on the parameters of gross canals used in draining peat-bog deposits for extrating peat. Also described here are the working organs connected with the MTP-71 excavator used in repairing the conducting canals.

Contains 2 illustrations, 1 table, and a bibliography with 6 titles.

UDC 622.331.662.812

B. A. Bogatov, V. N. Yes'man, "Development and Groundwork for a New Profile of a Pressure-Type Canal," TORFYANAYA PROMYSHLENNOST', 1983, No 5, pp 24-26.

Provided here are the results of laboratory studies of canals with direct and extruded buckles along the cascade line. Under production conditions studies were made on four variants of pressure-type canals with differing profiles. It is shown that, when a pressure-type canal is used with an extruded surface of a long working matrix, executed along the cascade line, a reduction in the expenditure of energy for pressure by 16.7 percent is achieved along with an increase in the service life of the canal by a factor of 1.5--2.

Contains 3 illustrations, 1 table, and a bibliography with 2 titles.

UDC 553.97:550.8

I. F. Largin, B. V. Kurzo, "Methods for Determining Predictable Reserve Supplies of Sapropels in Lakes with Varying Degrees of PeatoContent," TORFYANAYA PROMYSHLENNOST', 1983, No 5, pp 27-29.

Proposed here is a method for determining predictable reserves of sapropels by categories of ash content for lakes of various peat contents with the use of large-scale topographical maps and aerial photographs.

Contains 4 tables and a bibliography with 7 titles.

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CSO: 1822/315

## NUCLEAR POWER

### RATIONALE FOR IGNALINSKAYA 'AES' CONSTRUCTION STATED

Vilnius SOVETSKAYA LITVA in Russian 16 Jul 83 p 1

[Article: "1,500,000"]

[Text] One million five hundred thousand kilowatts--this is the capacity of the first power unit of the Ignalinskaya Nuclear Electric-Power Station.

Each trip to its construction site is like a journey into the future. It is true, the fact that it already exists in this day and age is somewhat unusual. For example, many of its features--innovative technology and equipment, and a large number of the aspects of the human interrelationships--had been slated for tomorrow, where everything that is still only being formed is to be developed and improved. At the same time, the continuity of our plans, the momentum of their ascent along the steep slopes of the economy's development, are visible more clearly in Snechkus than anywhere else, perhaps. Ever higher, higher and higher....From the small to the large, from the large to the gigantic. In 1980 the Soviet people noted with pride the 60th anniversary of Lenin's GOELRO [State Commission for the Electrification of Russia] plan. And now the gigantic power program that Yu. V. Andropov described at the June CPSU Central Committee Plenum as, "...the greatest document of long-range importance, in its own way a GOELRO under modern conditions," is being realized.

The Ignalinskaya AES has a noteworthy place in this program.

And now let us try to answer this simple and logical question: "Why is the gigantic power complex being erected at precisely this time?"

In the 1960's, thanks to the introduction of the Litovskaya GRES imeni V. I. Lenin of Litovenergo [Lithuanian Regional Power Administration] into operation, not only were the needs of the republic for power being completely supplied, but a large portion of it was being sent outside the republic's borders. However, as a result of the economy's burgeoning development, requirements have risen rapidly. In 1980, 370 million kWh of electricity came to Lithuania from the mighty stream of the USSR Unified Power System. In 2 years this flow has been tripled. And so it is that the first reactor at the Ignalinskaya nuclear station will go into operation at an extremely opportune time.

And still another question: "Why is a nuclear, not a thermal, electric-power station being built?"

It would seem that the fact that each year 67,500 railroad cars of coal, but only 3 of uranium fuel, would be needed to operate the 1½-million kW capacity station is sufficient. This circumstance also is of enormous importance: the AES will cause less than 1 percent of the harm to the environment that a thermal station of equal capacity would.

The year 1983 is the startup year for the Ignalinskaya nuclear station. The first power unit, brought into operation by the 1½-million kW giant reactor, will produce current. However, work today is being done not only on Drukshchyay shores. So the information about practical execution of the power program that we are beginning to publish today will tell about the builders not only of the nuclear power station but also of power transmission lines, transformer substations and accumulators of various types.

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CSO: 1822/325

## NON-NUCLEAR POWER

### REVISIONS IN ECONOMIC MECHANISM SUGGESTED FOR POWER ENGINEERING

Moscow PLANOVYE KHOZYAYSTVO in Russian No 7, Jul 83 pp 80-85

[Article by A. Troitskiy, chief of a USSR Gosplan Department: "On the Economic Mechanism in Electric Power"]

[Text] In the modern era, electrification is a most important material base for the deep transformation of social production and of the people's working and living conditions. Electricity is the most progressive, easily transported and manipulatable form of energy, which is generated in centralized fashion on a nationwide scale. This form of energy corresponds in exemplary fashion to the modern stage of the social and scientific revolution. It is used for executing drive processes and for illumination, and, at the same time, it is increasingly revealing its potential as a transforming tool in electrochemical, electrophysical and other technologies, and it serves as the operating basis for communications and for means of automation and control. It can be said without exaggeration that electricity is now emerging as a circulatory system for the entire complicated national-economic organism. So the state and the party are paying great attention to developing the power-engineering industry, whose indicators traditionally occupy the first line in published plans for and results about growth of our country's industrial production.

By virtue of the progressive transforming influence of electrification on the country's economy, the anticipatory development of electric power is constantly being supported. During the 11th Five-Year Plan, while total growth in the consumption of fuel and power resources will be 13 percent, the consumption of electricity will increase by 20 percent. During the last 2 years of the current five-year plan, the generation of electricity grew from 1,294 to 1,366 billion kw-hr, or by almost 6 percent. More than 18 million kW of new electrical capacity were put into operation.

Electric-power engineering is being developed in organic coordination with the prospects for the fuel and power balance. With a view to reducing the requirement for fossil fuels, especially mazut, nuclear electric-power stations are being built at an outstripping pace in the country's European portion. As CPSU Central Committee General Secretary Yu. V. Andropov noted in a speech to the June 1983 Plenum of the party's Central Committee, "the future of our power engineering lies primarily in the use of the newest nuclear reactors, and in the long term also in the solution of the problem of thermonuclear fusion." During 1981-1982 the rated capacity of AES's rose by 38 percent,

and the generation of electricity increased by 32 percent, and in 1982 it went to the 100-billion mark. More than a third of the growth in the country's consumption of electricity and 70 percent of the growth in its consumption in European regions, which are situated west of the Urals, where a reduction in fossil-fuel consumption is especially important, have been provided by nuclear power stations. An accumulation of AES power capacity provides also for a rise in the effectiveness of electrification by increasing the reliability of the power supply, because of the fuel autonomy of the AES's and a lessening of the dependence of power engineering on the timely supply of fuel to electric power stations and the quality of the fuel delivered.

Major tasks are to be solved in the industry in 1983. The plan requires that electrical generation be increased by almost 3 percent, that it be brought up to 1,405 billion kW-hr, including electrical generation at AES's, where it should grow during the year by more than 22 percent. It is planned that the AES's will provide for 55 percent of the growth in the country's consumption of electricity, about 90 percent in the European regions. For this purpose, it is necessary to put into operation in 1983, throughout the USSR as a whole, 13 million kW of new capacity, including 5.5 million kW at nuclear power stations and 1.1 million kW at hydroelectric power stations, and to increase the reliability of the power supply. As a result of conducting the contemplated measures, the electric power to worker ratio in industry will grow by 5.7 percent in 1983 over 1980 and will reach 27,600 kW-hr per worker; in agriculture the corresponding figures will be 19 percent and 4,300 kW-hr per worker. For the country as a whole, the generation of electricity per capita will be increased during this period by 6.3 percent, and in 1983 it will be 5,175 kW-hr.

However, it should be noted that in recent years electrical supply for the national economy has been provided under strain. The reliability of the national economy's electrical supply is increasingly being predetermined by the reserve capacity in the power systems, which in many cases is not adequate. This is caused mainly by the fact that USSR Minenergo [Ministry of Power and Electrification] did not provide during the 10th Five-Year Plan and the first 2 years of the 11th Five-Year Plan for fulfillment of the plan for putting new capacity into operation.

Along with the unsatisfactory organization of power-engineering construction, deficiencies in the supply of materials and equipment have exerted and are exerting an influence on progress in the erection of power stations and power grids, because of which power-engineering construction projects suffer delivery shortfalls annually of up to 10 percent for metal section and up to 30 percent for lumber. Inadequate reliability and stability of the power supply are also occasioned by inadequate use of the power capacity that exists within the industry. One of the causes of this situation is the lack of development of a system for motivating power-station personnel toward optimal utilization of capacity. Under the existing economic mechanism, the industry lacks appropriate evaluative indicators.

Moreover, in recent years, the amounts of repair and rebuilding operations in power engineering, which come to 2.5 billion rubles per year, have increased because of the aging of some of the existing pool of power equipment. Because

of this, and also because of nonobservance of the standard periods for equipment repair and the inadequate quality of it, the amount of power equipment that is under repair in the fall-and-winter period has increased, which leads to growth in unused capacity.

The standard of all work on the construction and introduction of new power capacity into operation and on the assimilation of the capital investment and material resources that have been allocated to the industry must be raised, in order to improve the national economy's supply of electricity. Much depends here upon USSR Minenergo. Many construction subunits are still performing site preparation and organizing construction and installing work unsatisfactorily. A substantial portion of the ministry's construction projects are not fully manned, mainly because of a lag in the construction of housing, which leads to high turnover of construction personnel. At the same time, the capacity of the ministry's housing-construction plants are being utilized by only 75 percent, on the average. It is necessary also to provide for the priority supply of materials and equipment for power-engineering construction.

Improvement in the utilization of existing power-engineering capacity plays a major role in increasing reliability and quality of the power supply. And, in our view, improvement of the industry's economic mechanism and of the whole system of plan and evaluative indicators can be important levers in this area. The existing system of indicators is aimed mainly at incentives for reducing production outlays (or increasing profit) and saving fuel, but it does not in practice bring about responsibility for and motivation toward an uninterrupted and reliable supply to the customers of the power that is generated, which is the industry's main task. Of course, the problems of reducing outlays, increasing production effectiveness and saving fuel at power stations are very important and should be reflected in the system of plan and evaluative indicators of the activity of both the industry as a whole and of individual production collectives. However, the somewhat one-sided role of these indicators in the industry's system of evaluation and incentives is reflected negatively in the national economy's effectiveness. Thus, a striving to save fuel by any means possible, which gives a right to a corresponding incentive, leads to power-station personnel restricting in some cases the utilization of TETs capacity or of uneconomical equipment. In this case, it is not considered that a shortage of capacity as a whole throughout a power association restricts the release of power to industrial customers. The harm caused to production in this case exceeds severalfold the benefit from the fuel saving obtained by power-engineering personnel.

Moreover, recently the fuel-saving indicator has, in specific cases, come into contradiction with the interests of optimizing the fuel balance. It is known that the best figure for specific fuel consumption can be obtained by using higher-quality types of fuel--gas and mazut. On the contrary, the utilization of low-quality, low-calorie and high-ash fuel leads to an increase in specific consumption therefor, requiring, moreover, major expenditures of labor by personnel. The existing plan indicator for specific fuel consumption for power generation thereby actually encourages combustion of the scarcer types of fuel and a search at electric-power stations and associations for ways to reduce the use of fuels that are not in short supply (shale and low-quality coal).

The experience of recent years, especially 1982, showed that the establishment of rigid ceilings on mazut consumption for USSR Minenergo cannot prevent the indicated negative influence of this indicator in its modern form. Thus, in 1982, according to USSR Minenergo, an overconsumption of more than 2 million tons of mazut above the plan throughout USSR Minenergo was permitted, while there was a simultaneous increase of as much as 25.2 million tons in coal reserves at power-station storage as of 1 January 1983 (versus 19.4 million tons on the same date in 1982). Such incentives for burning scarcer types of fuel create additional difficulties in power-station fuel supply, which intensifies the strain in supplying electricity.

Of course, the existing system of plan and evaluative indicators in power engineering is not the result of some kind of lack of understanding of the state of affairs. The essence of it is the fact that it was formulated under somewhat different conditions, when a shortage of power-engineering capacity and the necessity for reconstructing the fuel balance had not yet manifested themselves. And the complexity of developing a system of plan and evaluative indicators that reflect organically the national economy's ultimate interests for such a specific branch as power engineering also was telling.

It would seem that it would be simpler--by analogy with other branches of industry--to establish the amount of electricity and heat energy to be generated as the main indicator for power engineering, with a view to motivating the industry to generate the amounts of energy needed and to make the industry responsible for the power supply. However, introduction of this indicator will not help in the economical consumption of electricity and heat. The power engineers will be motivated toward marketing as large an amount of energy as possible to the customer. Where such a motivation exists, as experience indicates, even the most rigid restrictions and administration in the area of energy consumption cannot yield the desired results. Neither must we forget the technical specifics of transporting, distributing and marketing heat and electrical energy, which are not stored and which can be received regardless of the will of the supplier. Under such circumstances, the indicator of the amount of energy produced cannot be adopted as the basic plan and evaluative indicator. Moreover, it is apparent that USSR Minenergo must retain its right to revise the indicator in accordance with the results of monthly and quarterly operation of the industry, taking actual energy consumption and climatic and other factors into account.

Under the prevailing situation, work to improve the economic mechanism in electrical-power engineering should, in our view, take the following basic directions. First, a plan indicator that will motivate personnel toward utilization of a power station's design capacity and toward raising their responsibility for this must be developed and introduced. Introduction of this indicator will intensify initiative and responsibility toward putting rated capacity into circulation and eliminate existing gaps between the design and the actually assimilated capacity, as well as technical restrictions on the use of existing capacity. Under modern conditions, as has been pointed out, power stations are not motivated toward eliminating the lack of correspondence that arises between designed and assimilated capacity.

It goes without saying that the proposed indicator will increase the motivation of power-station personnel to refuse to accept for operation new capacity that is not completely finished or of poor quality construction. Insufficient exactingness on the part of USSR Minenergo's operating personnel on these matters toward the construction and installing organizations leads to substantial underutilization of new capacity during the winter.

Second, the existing plan and incentive indicator of specific fuel consumption for generating energy must be improved with a view to differentiating the measure of its effect as a function of the type of fuel, and to making it more flexible. It is possible that it will be desirable to reject this indicator for certain types of fuel, and, for some types, to make fulfillment of it only a prerequisite for the incentives for the fulfillment of other indicators (for example, readiness of installed capacity for operation). This is all the more urgent because considerable successes have been achieved in recent years at many of the country's power stations in reducing specific fuel consumption. The realistic technical potential for improving this indicator and for obtaining benefit for the national economy from it are extremely small. At the same time, it would be incorrect to reject this important indicator as a whole. We are referring here, we repeat, to improving it, by combining it flexibly with other indicators of no less importance for the industry.

Third, the responsibility of the industry's maintenance and repair personnel for timely and good-quality maintenance of the equipment should be increased, and material incentives for meeting the appropriate requirements should be defined more rigidly. Therefore, it is desirable to examine the planning indicators that are used in this sphere of power-engineering activity. A possible progressive incentive for personnel to provide for uninterrupted, breakdown-free operation of power-engineering equipment is of interest. There are other directions also for improving the levers for guiding the economic mechanism toward the operating results of the power-engineering activity. Obviously, it is also useful and even necessary to differentiate indicators by level of management, and, possibly, also by power association, that is, to make them flexible tools for influencing operating results.

USSR Gosplan, in considering the urgency of the problem of improving the economic mechanism in electric-power engineering in the area of tying evaluation of the activity of the industry and its labor collectives more closely with the effectiveness and reliability of the power supply, has posed the problem to USSR Minenergo's management. The ministry has promoted appropriate work on reexamining and improving the system of plan and evaluative indicators with a view to taking modern conditions into account. The task consists in completing this work more rapidly.

The solution of a number of questions that lie beyond the sphere of the direct management activity of USSR Minenergo can exert a great positive influence on increasing the reliability and effectiveness of the power supply, but a restructuring and improvement of the economic mechanism of the appropriate interdependent industries are need for this purpose. One of these questions relates to the quality of the fuel that is being delivered to electric-power stations by USSR Minugleprom [Ministry of Coal Industry]. In recent years it has been deteriorating. Thus, during 1975-1981 the ash content of the coal

burned at TES's rose, on the average, from 29 to 33 percent--grade T Donets coal from 24 to 36 percent, Kuznetsk coal from 19 to 23 percent and Moscow Basin coal from 39.6 to 48.5 percent. The coal's calorific value fell during this period from 4,200 to 3,850 kcal/kg on the average--from 5,670 to 5,015 for grade T Donets coal, from 5,570 to 5,350 for Kuznetsk coal and from 2,355 to 2,000 kcal/kg for Moscow Basin coal.

This lessening of coal quality leads to power equipment operating on fuel that has properties for which the equipment was not designed, which, in turn, causes a loss of power-station operating capacity. Thus, according to USSR Minenergo data, power dropped 3-4 million kW in 1981-1982 because of deliveries of coal of reduced quality. Moreover, as a result of the worsening of coal quality, much additional mazut had to be consumed to maintain stable combustion in boiler fireboxes. All this leads to overconsumption of fuel and great nonproductive expenditures for transporting it. According to USSR Minenergo data, because of degraded coal quality, each year hundreds of thousands of additional railroad cars are needed for transporting it and about 700 million kW of electricity are consumed in handling it at the TES's, and fuel overconsumption because of reduced boiler efficiency reaches 3 million tons of standard fuel equivalent.

Coal-quality deterioration is definitely connected with change in the geological conditions for getting the coal during exploitation of the fields. However, the coal industry's system of plan-evaluation indicators, in which the amount of mining is planned and accounted for in actual gross tons, plays no small role. It is desirable to review the question of planning coal mining to take into account the coal's heating value, that is, the tons of standard fuel equivalent. This should bring great benefit to the national economy.

The coordinated rationalization of power-consumption practices in industry also can benefit the national economy economically. Calculations indicate that the requirement for power-station capacity can be reduced 8-10 million kW without reducing industry's level of electrification by reducing power consumption at industrial enterprises when maximum demand is made on power systems. Certain economic levers that are necessary for this purpose have been brought to bear. However, this work must continue. Recommendations should be prepared for creating additional economic stimuli for industry to reduce both power consumption during the power system's peak-demand hours and daily power consumption by increasing consumption at night in those industries where technological and social factors will not cause serious difficulties or outlays. Such measures will allow demand to be reduced and fuel losses from forced unloading of power-station equipment at night to be cut. It would seem that the economic benefit so obtained can be aimed at stimulating industry to introduce effective power-consumption practices.

Solution of the problems that have been set forth will meet the requirements formulated at the November 1982 CPSU Central Committee Plenum by CPSU Central Committee General Secretary Y. V. Andropov: "The chief thing is to speed up the work to improve all spheres of supervision of the economy--management, planning and the economic mechanism."

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## PIPELINE CONSTRUCTION

### EXPERIMENTS AND LESSONS DRAWN FROM PIPELINE CONSTRUCTION

Moscow EKONOMICHESKAYA GAZETA in Russian No 31, Jul 83 p 16

[Article by Candidate of Technical Sciences R. Shakirov, first deputy chief of Glavvostoktruboprovodstroy: "An Experiment and Its Lessons: From the Experience of Building the Urengoy-Uzhgorod Natural Gas Pipeline"]

[Text] Approximately one third of the entire volume of work involved in building this one-of-a-kind natural gas pipeline, stretching a distance of 4,451 kilometers, fell to the lot of subunits of Glavvostoktruboprovodstroy -- the Main Territorial Administration for Construction of Trunk Pipelines. That part of the pipeline built by them cuts across the territories of Tyumen, Sverdlovsk, Perm, and Kirov oblasts, as well as the Mari, Udmurt, and Tatar autonomous republics.

At the present time a great deal is being written, and with reason, about the shock-work labor performed by the builders of this export natural gas pipeline and the record time in which it has been built. But apparently few people know that a large-scale experiment was conducted on the pipeline right-of-way, which helped intensify the pace of construction. Our main administration took part in this experiment along with others.

#### Pipeline Spreads

The experiment essentially consisted in shifting to the performance of jobs stage by stage by what are called spreads. I shall use the example of our main administration to explain the need for the reorganization.

There has long been in progress a search for a structure of management and internal economic management mechanism which meets the requirements of intensifying production. Reorganization of narrow-specialization trusts into combined trusts can be called the first stage along this road. We organized eight such trusts, located in different parts of the country. They included specialized construction, installation, and earthmoving administrations. Trust officials bore total responsibility for the construction project, including preparation activities, testing and handing over pipelines ready to operate. The pace of construction of these pipelines increased by 30 percent in 1981 over 1979. The pipeline spreads of which brigades from the specialized administrations of a trust were a component part reached a performance level of 60-80 kilometers of pipeline per year.

Success was being achieved. But construction of such large trunk natural gas pipelines as the Urengoy-Petrovsk and the Urengoy-Novopskov showed that as construction volume increases and construction pace rises, a gap formed: preparation and technical work began to fall behind line work proper. Even a substantial concentration of labor and material resources failed to achieve an appreciable shortening of the preparatory and completion periods of construction. On the Urengoy-Novopskov line, for example, an average of 3.4 days were spent on basic job operations in building a kilometer of pipeline, while the figure was 2.9 days for the concluding stage.

At this stage, on the approaches to the experiment, so to speak, we had not yet succeeded in overcoming the general situation of disconnection between specialized brigades, each of which had its own plan indices, its own targets and incentives, and its own management.

Running ahead, I can note that many problems were solved by adopting the spread contract, when pipeline spreads began operating on a single job schedule. A focus on achieving high end results and unity of goals and tasks helped introduce cohesiveness to work crews forming part of a single spread and helped speed up the work pace.

The shift to a unified work order is only one of the conditions of the experiment. Another consisted in reorganizing the structure of management.

To implement the measures specified by the conditions of the experiment and to give the trusts methods assistance, a coordination council was formed in our main administration, as was the case in a number of others as well. The council consisted of leading specialists as well as representatives of the Ufa Scientific Research and Design Institute for Organization of Oil and Gas Pipeline Construction and the standards research station.

Fourteen combined technological flows [spreads] were formed on the basis of the recommendations drafted by the council for performing the principal jobs on the natural gas pipeline -- ditching, stringing, alignment and welding, coating, wrapping, and lowering in.

Mobile mechanized complexes for road building, transport, and engineering jobs were organized to handle the preparatory and final construction stages.

We shall briefly list the activities of the road construction and transportation subunits. They had the job of clearing the right-of-way, constructing a continuous roadway along the right-of-way as well as access roads, hauling pipe and materials to the right-of-way, as well as performing loading and unloading operations. The requirements were spelled out clearly: he who hauls pipe and materials is the one who builds and maintains the roads.

The engineering-process subunits perform yard double jointing, handle installation of difficult crossings, compressor station connections, clean and test the line. Thanks to this reorganization, the pipeline spreads were able to weld, coat, wrap, and lower in without scattering their manpower and resources.

## Results

A comparative analysis of construction of the Urengoy-Petrovsk, Urengoy-Novopskov, and Urengoy-Pomary-Uzhgorod natural gas pipelines conducted by main administration specialists together with the All-Union Scientific Research Institute for the Construction of Trunk Pipelines and the All-Union Scientific Research and Design Institute for Organization of Oil and Gas Pipeline Construction, confirmed the high degree of efficiency of building a large-diameter natural gas pipeline by the spread method. In fact, the average output of each spread amounted to 100-122 kilometers of completed pipeline per year -- almost twice the previously attained rate. Work at the completion stage of construction was accelerated by a factor of 1.5.

The road building and transportation components shortened the preparatory period. In the Komsomol'sktruboprovodstroy and Omsknefteprovodstroy trusts, for example, working in swampy taiga areas of Tyumen and Sverdlovsk oblasts, the spreads began welding, coating and wrapping and lowering in not in January, as customary, but 2 months earlier. This made it possible to complete the basic line work in February 1983. The experience of these trusts indicates that good work organization in the preparatory period, even in extreme conditions, substantially reduces the interseason construction gaps.

## Increasing Cost Accountability

Looking back at what has been accomplished, other conclusions can also be drawn. In particular, an increase in the work efficiency of subdivisions should be based on the one hand on further development of cost accountability, and on the other hand, on improving management.

Let us take such an item as operating on a single work order. Labor remuneration according to a single work order in the pipeline spreads gave greater incentive to each individual for achieving excellent end results and fostered labor productivity growth. EKONOMICHESKAYA GAZETA has written about this. But nothing has been said about converting road construction-transportation and engineering-process components to a single work order. A system of labor remuneration based on single work orders has not yet been devised for them, which places these components under unequal conditions with the line components proper and complicates the adoption of a pipeline spread contract for the entire job.

I believe it is high time to extend the principles of the brigade contract to other elements as well -- the construction equipment servicing and maintenance mechanization administrations and job quality control sections.

Shortening of construction schedules, extensive construction of large-diameter trunk pipelines, and utilization of enormous quantities of heavy equipment demand a higher level of information support and organization of special information collection and processing services, with highly developed communications and computer facilities, concentrating them in a single agency -- an operations management body of Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises]. It is also necessary to continue centralization of the principal management functions in the trusts.

We are saying that for the first time an entire system of natural gas pipelines is running through a common energy "corridor." But if this is so, such a "corridor" must not only be designed but also built at one time, not expanded as each new pipeline is laid down.

It has become obvious that with this approach it is advisable to accomplish allocation of land and forest acreage and to issue right-of-way forest clearing authorizations for the entire width of the "corridor" at once, not for a single line within the overall system of parallel pipelines, as is currently the practice. This will make it possible to enlist timber cutting organizations to engage in a single large-volume logging operation, to concentrate resources and ensure against ruining a large quantity of commercial timber. Construction crews will be able to ensure that preparatory operations are completed in advance throughout the entire "corridor" area, which is extremely important for us.

Boosting the work pace on the basis of intensification of production, the construction people have thus drawn away from their partners, as it were. The time gap between equipment delivery and commencement of engineer-process work is running between three and four months. At the Arskaya and Chaykovskaya compressor stations, for example, the line hookups for the Urengoy-Uzhgorod natural gas pipeline were not completed until the end of May, while all line work was completed in February-March. As a result the construction completion period on that section was unwarrantedly delayed by almost 3 months.

Obviously it is essential to supply natural gas pipeline projects with equipment sufficiently in advance. This will enable the engineer-process components to set up pipe welding and fabrication yards.

Project design, manufacture and delivery of equipment, structures and materials is a unified process. And yet up to the present time unfortunately we see no unified management -- the process is broken up among ministries. In our opinion this entire process should be under the unified and rigid oversight of a single branch. This will make it possible to reduce the amount of uncompleted construction and guarantee "turnkey" delivery of natural gas pipelines on the shortest possible timetable.

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CSO: 1822/320

## PIPELINE CONSTRUCTION

### PIPELINE REPORT FROM UZHGOROD

Moscow TRUD in Russian 14 Jul 83 p 3.

[Article by TRUD special correspondent A. Kalashnikov, Uzhgorod: "Advancing Toward Urengoy Gas: Report From the Transcarpathian Section of the Urengoy-Pomary-Uzhgorod Natural Gas Pipeline, in the Construction of Which Construction Workers From the Polish People's Republic Are Taking Part"]

[Text] "And now, as they say, hold on to your hat," Mieczyslaw smiled.

The "Uazik" turned off the dirt road and headed up into the mountains. Through the windshield you got an alternating view of mountain peaks and ground rushing under the vehicle. In between I caught glimpses of the natural gas pipeline, which at one point changed from a solid line to a dashed line. That is where we were headed. As we drove toward our destination I kept thinking about what a great deal of skill is required of a driver to handle heavy stringing trucks on mountain terrain.

Welding was in progress here, and the dashed line of pipe sections which had been hauled to the right-of-way and strung into a line was being transformed into the solid line of a natural gas pipeline. The colorful "Energopol" emblem of the PPR General Construction Board for Water Management Structures and Energy Pipelines was glued on the cab of a sideboom tractor, the same as on our "Uazik."

Construction workers from various parts of the Polish People's Republic are building the pipeline from the western border of the USSR. Thirty-eighty kilometers further down the line, in the Carpathians, Energopol workers are linking up with their neighbors from the Transcaucasian Pipeline Construction Administration.

My companion, Mieczyslaw Przeczyna, in charge of field operations, introduced me to the sideboom tractor operator: "Stanislaw Kazimierczak, from Poznan," the driver introduced himself and, without waiting for questions, told me that he had been in the USSR before, that he had worked 3 years on construction of the Soyuz natural gas pipeline.

Meeting Polish construction workers, I would again and again sense the pride in these words spoken by the Energopol veterans, those who had built the Soyuz natural gas pipeline together with Soviet, Bulgarian, Hungarian, German, and Czechoslovak fellow workers.

"Now I am once again working on a construction project in the Soviet Union," S. Kazimierczak continued. "And what a project; the 'construction project of the century'! It is the first time I have worked on mountain terrain. Of course it is more difficult here, but it is also more interesting and exciting."

Stanislaw had a few free moments while the welders were at work. We lit a cigarette, sitting on the string of pipe, this famous, unique pipeline almost one and a half meters in diameter, which before the end of the year (just imagine!) will stretch unbroken from here to Urengoy. I had the feeling that Kazimierczak was also thinking about the same thing. Slapping his palm on the steel wall of the pipe, he said: "I will have a good memory of this job my entire life. I shall be proud before my children and grandchildren in the knowledge that my labor is invested here as well. I'll say! Grandiose plans, a shock-work project! But it is not mere happenstance that they also call the 'construction project of the century' a construction project of peace, friendship, and cooperation. The gas field workers of Urengoy and the Energopol workers, their fellow workers from the GDR, who are building a section of the pipeline in Ivano-Frankovsk Oblast, and our neighbors, gas industry workers from Armenia, will be proud of it in equal measure. That is the kind of project it is."

Completing a bead, the welders emerge from under a canvas cover, which enclosed the pipe ends on all sides.

"Completely windless conditions are needed for a high-quality weld," Jerzy Tokarz explained the reason for the "screen." "I'll tell you frankly, before I came out here to the right-of-way and they told me I would have to take a requalifying test, I was insulted: do you think I am novice welder? Now I understand that everybody here must really be 'in form,' that this construction job is no place for casual workers. Here it's like..." he paused a couple of seconds, trying to find the right word for comparison, "well, like in the mountains," smiled Jerzy, describing a circle with his hands. "Like mountain climbers on a single line, we must rely on our neighbor as on ourselves. We all understand that this pipeline must be built quickly and brought on-line on schedule."

And the Energopol welders are working conscientiously -- without a single sub-standard seam to be rewelded. The Polish construction workers are doing a "turnkey" operation -- which includes coating and wrapping, lowering in, and cleanup.

Back at the Energopol base camp in the village of Sredneye I met one of the heads of the detachment of Polish construction workers, Kazimierz Zajac. He began our conversation with some kind words about the oblast party committee and trade union council.

"At project coordination headquarters attached to the Transcarpathian Oblast party committee, we handle any production problems which arise. We know that they will always help us. Excursions in the Transcarpathians are also organized for Energopol workers, and we have attended several concerts put on by oblast performer groups. Wherever we go, we are met with hospitality and cordiality, and this is so important in the nomadic life of construction workers."

These emissaries from the Polish People's Republic recently visited the Uzhgorod Experimental Gas Pipeline Turbine Equipment Plant. They inspected the plant's shops, cultural and employee services facilities, and became acquainted with the daily life of the workforce.

"We consider this construction job not only to be a most important economic project," K. Zajac continued, "but also a genuine school of internationalism."

The force of Polish construction workers has entered international socialist competition, an agreement on which was recently signed in Kiev by representatives of the Soviet, German, and Polish construction workers on the Ukrainian segment of the natural gas pipeline. On 16 April a Communist Subbotnik [unpaid mass workday] dedicated to the 113th anniversary of V. I. Lenin's birth was held on the Energopol jobs, while on May Day Polish construction workers marched in the parade in the Carpathian village of Patskanevo.

...The transcontinental pipeline is extending further and further eastward from "point zero" in Uzhgorodskiy Rayon. Shock-work labor and joint efforts by the construction workers of the brother countries -- this is a guarantee that Siberian natural gas will be flowing through this pipeline in the first quarter of next year as scheduled.

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CSO: 1822/320

## PIPELINE CONSTRUCTION

### CONSTRUCTION REPORT

Moscow IZVESTIYA in Russian 26 Jul 83 p 1

[Article by B. L'vov and G. Panushkin: "Trunk Pipeline on Stream! Work Has Been Completed Ahead of Schedule Along the Entire Urengoy-Pomary-Uzhgorod Natural Gas Pipeline"]

[Text] A notable event took place on 25 July on the central construction project of the five-year plan -- the right-of-way of the Urengoy-Pomary-Uzhgorod natural gas export pipeline: the final several hundred meters of the transcontinental natural gas trunk pipeline were coated, wrapped, and lowered in. Thus the world's greatest underground transport artery is virtually ready to convey gas along its entire length.

Behind lie 4,451 kilometers of very difficult advance from Asia into Europe across permafrost, swamps, taiga, mountains, numerous rivers, rail lines and highways. Natural obstacles stretched hundreds of kilometers, while the man-made lines of communication crossed by the construction workers of Minneftegazstroy [Ministry of Construction of Petroleum and Gas Industry Enterprises] ran in the hundreds. The total length just of underwater crossings along the route totaled two hundred kilometers.

Other figures are also of interest. Earthmoving totaled about 130 million cubic meters, which is considerably greater than the total excavation involved in the Volga-Don Canal. The total length of welded seam exceeds 2,200 kilometers, while the total area of insulation coating and wrapping runs to almost 30 million square meters. For comparison we shall note that an area that size could accommodate a city with a population of almost 3 million.

And finally, we must mention the pace of construction and installation work, especially at the first stage. In June of last year, when the construction project was just beginning, only 55 kilometers of pipeline had been coated, wrapped and lowered in; 3 months later the total was 376 kilometers, and 515 kilometers in December. In other words, the first half of the giant pipeline was built in just 7 months, while the second half took slightly more than half a year. That is the highest pace of construction in the history of world pipeline construction, and nowhere else on earth are they building natural gas pipelines almost one and a half meters in diameter.

Simultaneously, as the pipeline was completed, final testing and startup operations were being conducted all along the line. To date more than 4,000 kilometers of pipeline have been tested, and close to 2,000 kilometers of the Transcontinental pipeline have gone into operation. This means that right now tens of millions of cubic meters of Siberian natural gas are entering the nation's Unified Gas Supply System each day. We shall note that this is being achieved ahead of schedule, far ahead of the targeted dates. And most importantly, as tests have indicated, the job has been accomplished with exceptionally high quality.

Ahead-of-schedule completion of this transcontinental trunk natural gas pipeline, involving an army of almost 40,000 construction workers, attests not only to an unprecedentedly rapid pace both on the line proper and on the primary compressor stations, at which primarily Soviet-built equipment has been installed. This reflects the high level of Soviet industry, of our engineers and technicians, designers, and construction workers, whose hands have built a truly unique structure, and the machine building workers who manufactured the machinery, mechanisms and instrumentation at an up-to-date technological level.

As work on this pipeline is completed, the workforces, having completed their tasks ahead of schedule, are being transferred to the fifth right-of-way from Siberia -- the Urengoy-Center natural gas pipeline, stretching more than 3,000 kilometers. Here too, just as on the Urengoy-Pomary-Uzhgorod pipeline, an outstanding job is being done by V. Kernitskiy's spread near Nadym, A. Skokov's spread in the Urals, and A. Buyankin's and V. Belyayeva's spreads in Central Russia.

Once again pledges to complete the job ahead of schedule have been made. The entire preceding experience of the Minneftegazstroy competition pacesetters attests to the fact that the construction workers' word will not diverge from deed on the fifth trunk pipeline of the 11th Five-Year Plan as well.

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CSO: 1822/320

## PIPELINE CONSTRUCTION

### JULY PROGRESS REPORT

Kiev PRAVDA UKRAINY in Russian 4 Aug 83 p 1

[Article, published under the heading "From Urengoy to Uzhgorod," by Ya. Zhukovskiy: "Pulse of the Construction Project"]

[Text] Gas has now entered the gigantic Urengoy-Pomary-Uzhgorod transcontinental trunk natural gas pipeline -- it is flowing through a steel channel almost one and a half meters in diameter, carrying beyond the Urals mighty energy from under Siberia. And work is in the completion stages at the western end of the pipeline. All principal process operations were completed in July, substantially earlier than pledged: the final kilometers of strung pipe have been welded, the pipeline has been coated and wrapped, lowered in, and back-filled. Pressure testing is in progress along the entire Ukrainian part of the pipeline, and finished sections are being turned over to the state commission.

By the end of July a total of 1,062 kilometers of pipeline had been tested: pressure in the pipe was boosted above 80 atmospheres -- an ample margin of safety. The longest segment of the pipeline, with all valves and bypass lines welded into the line, and completely tested, stretches 403 kilometers across Kiev, Vinnitsa, and Khmel'nitskiy oblasts, plus an additional 53-kilometer section in Ivano-Frankovsk Oblast. The pipeline is also being tested in Cherkassy Oblast -- 68 kilometers is ready to go on-line. Three sections have been tested in Poltava Oblast -- of 25, 18, and 40 kilometers. The gaps between them are small, and there are also quite small sections which have been fully tested, but 244 kilometers of fully tested pipeline extend further eastward, plus an additional two sections 123 and 45 kilometers respectively.

Thus testing will be completed within the next few days. Only one gap remains, in Poltava Oblast, along the entire right-of-way crossing the Ukraine.

What remains to be done? Cleanup in those areas where this was not done immediately after backfilling, completion of installing and testing cathode protection against stray currents, plus completing installation of pipeline communications.

Next year a microwave relay line will extend along the entire right-of-way, providing multichannel communications, but for the time being the communications line put in by the construction crews is being retained and adjusted for service. Practical experience has shown that these communications operated

reliably, never failing. Both construction workers and future operating and maintenance personnel believe that all remaining problems will be corrected by the beginning (or middle) of August, and some time in August the line proper can be turned over for service.

Now all attention is focused on construction, installation and earliest possible completion of the compressor stations. The compressors for one of these stations have already been delivered and are in place -- at Bogorodchany in Ivano-Frankovsk Oblast. According to schedule the Bogorodchany compressor station is to come on-line in 1984, but construction workers from the German Democratic Republic who are working at the site, who have entered socialist competition for the earliest possible completion of all facilities on the Siberia-Western Europe natural gas pipeline, are appreciably ahead of the accelerated schedule and intend to complete the station this year. Construction workers are also ahead of schedule at two other compressor stations. The main compressor units, rated at 25,000 kilowatts each, manufactured at the Neva Plant in Leningrad, will be delivered to the Grebenka compressor station in August, followed by the Barskaya.

Principal resources are presently concentrated at the compressor station sites. Line construction workers have been reassigned to other major projects -- Urengoy-Center, and Shebelinka-Krivoy Rog-Izmail. The spreads have been reassigned -- only a few brigades and several pieces of equipment remain here on the right-of-way. On the Glavukr neftegazstroy sections, where as many as 1,200 workers were concentrated at the height of construction, there now remain not more than 100 persons.

Preparations are in progress for laying a parallel line on this unique trunk pipeline, also running to Uzhgorod. The new line will begin beyond Urengoy, in Yamburg, and for the most part will run parallel to the Urengoy pipeline, but in some places, including the Ukraine, a different right-of-way has been selected for it.

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CSO: 1822/320

## COMPRESSOR STATIONS

### COMPRESSOR MAINTENANCE PROCEDURES OUTLINES

Moscow NEFTYANOYE KHOZYAYSTVO in Russian No 8, Aug 83 pp 44-47

[Article by Z. M. Kamaleyev, Sibneftegazpererabotka [Siberian Petroleum Gas Processing Association]: "Improving the Operational Reliability of Compressor Equipment"]

[Text] Centrifugal gas compressor units are becoming more and more widespread in Minnefteprom [Ministry of the Petroleum Industry] organizations. These units are used in systems for intrafield collection and transportation of gas, at gas processing plants (GPP), in the gas lift method of petroleum extraction, at compressor stations equipped with centrifugal compressors, for the high pressure injection of gas into petroleum formations and for other purposes.

The main task of one such Minnefteprom organization -- Sibneftegazpererabotka -- is the processing of petroleum gas arriving from West Siberian fields and the delivery of products to customers. GPP have been built for these purposes in Nizhnevartovskiy and Surgutskiy Rayons in Tyumen Oblast. In addition, this association has high pressure compressor stations in operation to inject gas into formations at pressures up to 32 MPa. The basic equipment at these enterprises are various brands of compressors from the Neva Plant imeni V. I. Lenin and foreign firms: ChKD - Prague (Czechoslovakia), Creusôt-Loire (France), Mitsubishi - Dresser (Japan), and Dresser-Clark (Canada).

Production rhythm, the amount of gas received for processing and sent to customers and petroleum extraction all depend upon the stability of compressor equipment operation. Its operational reliability is of primary importance in this regard.

Studies show that foreign firms producing compressor equipment have a somewhat different approach to reliability problems than that in effect in domestic practice.

Based on an analysis of available technical documentation and operational practice, Sibneftegazpererabotka has acquired definite experience in compressor equipment operation. This has been taken into consideration in creating a system for the organization and repair of compressor equipment which uses contemporary methods for the control, repair, technical diagnosis and other effective measures. It is hoped that the experience in compressor equipment repair and servicing that it acquires would be useful for other organizations using centrifugal compressors.

The centrifugal compressors in operation at Sibneftegazpererabotka have been built and installed in accordance with contemporary requirements based on the latest achievements in world compressor construction. The following factors affect the longevity, reliability and productivity of units.

Installation, adjustment and startup. The breaking in and operation of compressor equipment depends to a great extent upon the quality of installation and adjustment work. To ensure the quality of such work during construction and startup, Sibneftegazpererabotka is enlisting association specialists with sufficient knowledge, experience and qualifications and who are directly participating in compressor installation, adjustment and startup. They also remain during the operational period and train service and repair personnel.

During installation work special attention is given to the technical state of the equipment being installed; to construction work quality; the observation of requirements in instructions, GOST [State standards] SNiP [Construction norms and regulations] and other technical documentation; the correspondence between the materials used and the requirements; welding quality in accordance with the GOSTs; the accuracy of all measurements when using high precision instruments and the observation of technical safety rules.

Prior to putting compressor equipment into operation and during startup-adjustment work, done mainly by the association, the following are carefully checked: the presence of foreign objects and dust in lines; the correspondence of all tolerances and dimensions to certificate data; the reliability of control, protection and interconnection equipment corresponding to documentation.

In preparing the units' lubrication systems for startup after installation, chemical cleaning methods are used; they are treated in a solution of orthophosphoric acid. All oil lines are soaked in a 12-15 percent solution of this acid for 15-20 hours, then washed in water and hot air dried. This method yields positive results and guarantees the reliable operation of all lubricated assemblies and connections.

II. Operating conditions. During compressor equipment operation several factors have been discovered to have a negative influence on uninterrupted operation. They include the following:

#### 1. Lubrication and seal systems

The condition of the lubrication system has an important influence upon the reliability of many compressor assemblies. Oil decreases friction and wear of bearings, protects gear teeth from corrosion and strain, carries away heat and is used in control and protective systems and in "oil - gas" seals.

In spite of the careful preparation of oil systems prior to startup, during compressor equipment operation sludge, metal particles and dust accumulate in the oil, causing its physico-chemical properties to deteriorate. The plan calls for the reprocessing of oil at each compressor station by PSM-3000 oil cleaning machines after 2,800 hours of unit operation. However, these machines do not provide for the continuous cleaning of oil. We have developed and introduced filters for the thorough cleaning of oil and installed them on each unit.

They use Regotmas-1-6 type filter elements, developed by the Vtornefteprodukt [Secondary Petroleum Product] Association. They filter out objects down to 10-15 microns. Their introduction has significantly increased the service life of bearings.

## 2. Design shortcomings.

During compressor operation we have made certain design changes directed towards increasing operational reliability. For example, the hydraulic antistall protective systems were replaced by pneumatic ones and the bearing temperature measurement systems on the K-380-103-1 units were changed. As a result, the number of forced stops has declined many fold.

## 3. Contamination of gas.

The deposits of West Siberia have a complex system for the collection of gas from fields, at which there are separators for trapping liquids and other elements. As a consequence of breakdowns in the operation of individual components of this complex system (no matter how careful the separation at fields), the petroleum gas arriving at GPP constantly contains hydrocarbon liquids in a dispersed state. Analysis shows that petroleum particles contain mechanically abrasive impurities. Entering the compressor, they are deposited on the running components. This has a negative effect upon the unit's gas dynamic parameters, causes compressor assemblies to deteriorate and leads to the premature wear of rotating parts. This problem has still not been solved.

III. Repair organization. The reliable and efficient operation of units depends substantially upon the observation of the requirements in the system of planned and preventive repair (PPR). For domestic equipment VNIIPgazpererabotka [All Union Institute for Planning and Research of Gas Processing] has developed the Regulations on the PPR of gas processing plant equipment.

The PPR system defines the structure of repair cycles depending upon specific operating conditions; the duration of interrepair periods; the amount of preventive and repair work in each type of repair; the length of repair down-time; materials and spare parts requirements and supplies record books for technical documentation of PPR systems.

The following measures are taken in conducting PPR at GPP and compressor stations:

- a. Repair plan schedules are compiled on the basis of the regulations
- b. Interrepair technical servicing and current, medium and capital repairs are conducted. A repair-adjustment administration has been created to conduct medium and capital repairs.
- c. Determination of the labor intensity and the number of workers necessary to conduct planned repairs.
- d. Organization of equipment record keeping.
- e. Compilation of orders for equipment and spare parts for PPR.
- f. Development of plan of organizational-technical measures ensuring improved repair quality, reduced labor intensity and prime cost of repair work, improved quality and reduction of equipment idle time during repairs.
- g. The study of reasons for and nature of part and assembly breakdown under specific work conditions and makes recommendations for increasing service life.
- h. Examination and introduction of progressive methods of part repair and rebuilding.

PPR work is preceded by the development of a plan for the step by step disassembly, discovery of defects, the making of revisions and repairs, checking parts and their state of repair and assembling the unit.

The prompt and careful analysis of part and component defects and breakdowns is a necessary condition for reliable operation. The causes of defects are studied in the following way: study of the unit after breakdown and taking the necessary measurements -- establishing its working conditions; and the study and analysis of the breakdown, collection of data on operating conditions and completed repairs -- the analysis of operating personnel's actions -- conclusions and proposals.

We have introduced progressive methods of unit repair in order to complete the work on time and at high quality. Using the component method of repairing K-380-103-1 compressors made it possible to: reduce repair time, improve quality, create a rational division of labor between work performers and complete part rebuilding operations without unit idle time. Guaranteeing the interchangeability of components and parts is an important condition for this method's introduction.

Powder metallurgy, which makes it possible to reduce defects, is being introduced to increase part longevity. Operating experience shows that careful flaw detection work on parts and components considerably reduces the number of defects in the units during operating time.

After a unit is opened up the following is done: measurement of clearances in running components, bearings and other parts, study of centering and degree of rotor balance on a balance test stand and the study of metal properties. To do this work the association's machine shops and laboratories have been supplied with VDN-1, UDN-3M, DUK-66, "Kvarts-15" and other types of balance test stands, hardness gauges and defectoscopes.

The existing PPR system sometimes does not give the expected results, since it does not take into consideration the actual state of operating compressor equipment. In order to obtain reliable information on a unit's condition to determine the possibility of continuing emergency free operation and the actual state of its components for the purposes of planning and improving repair processes, Sibneftegazpererabotka has developed and introduced a system for the technical diagnosis of compressors to replace the Regulations on PPR. This system was developed jointly with VNIPIgazpererabotka, MINKh i GP imeni I. M. Gubkin [Petrochemical and Gas Industry Institute imeni I. M. Gubkin, the Neva Plant imeni V. I. Lenin and VPO Soyuzneftegazpererabotka.

To select diagnosis parameters we have accumulated statistical data on breakdowns and made a detailed analysis and classification. The analysis of the causes of breakdowns is the first important step in diagnosis, making it possible to plan diagnosis parameters and consequently, methods.

Diagnosis parameters are determined on the basis of breakdown statistics. GOSTs set parameters for some types of equipment. In order to forecast breakdown free operation, the minimal number of parameters are selected. In the search for defects during repairs, a more complete set of parameters is used to characterize the conditions of various components (bearing clearance, rotor balance, etc.).

In centrifugal units the differences in pressure and temperature in the intake and blower lines determine the power consumed. This, in its turn, is linked to the condition of the running components (the presence of deposits on the control apparatus, impeller working channels, etc.). There are great potentials in the diagnosis of machines for vibrational and acoustical parameters. Vibrations and noise which show up during operation involve mechanical vibrations of parts resulting from forces and moments which depend upon installation clearances and operating forces (gas, inertia, and others). From an analysis of noise and vibration spectra at the oscillation and beating frequencies one can use calibration frequencies to establish both the initial and the resulting deviations from the rated resonant conditions and their sources.

The intensity and magnitude of wear in rubbing parts is diagnosed from the concentrations of their particles in the oil. Machine part wear is most intense during breaking in, it stabilizes later. If there are disturbances in components friction wear increases sharply and there are changes in the shape of the resulting particles. These operational analyses are performed using the quick test method at the Institute imeni Gubkin, where oil samples from each unit are sent every ten days. The association has also developed charts for unit technical conditions which show the limiting allowable gas dynamic parameters, vibrations and concentration of wear products in oils.

Gas compressor diagnosis reduces operating costs up to 20 percent by preventing units from going out of operation. Measurement and control instruments play a substantial role in this method. Imported compressors are equipped with standard instruments for monitoring bearing temperatures, rotor vibrations, rotor axial position during operation and other variables. There are similar domestic instruments, for example, the KSA-15 control signal apparatus.

Sibneftegazpereabotka is using the domestically produced VIP-2, BIP-6 and IShV-1 portable instruments. The introduction of vibration norms into gas compressor servicing is an important measure for improving unit operational reliability.

Unit service life can be considerably increased if the following are solved:

- a. Equip units with standard and portable instruments for measuring vibrations, temperatures of parts and components;
- b. Take into consideration unit operation at low temperatures to ensure performance;
- c. Standardize and unify parts and assemblies;
- d. Improve lubricating oil quality;
- e. Comprehensively implement the unified system of gas preparation;
- f. Improve the planned repair system.

Thus, the results of work done at the Sibneftegazpererabotka Association permit one to conclude that these measures were advisable and that it is essential to further improve the planned-preventive repair system, taking into consideration the latest achievements of science and technology.

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## ENERGY CONSERVATION

### CONSERVATION OF FUEL-OIL RESERVES

Moscow ENERGETIK in Russian No 8, Aug 83 pp 3-4

[Article published under the heading "Fuel, Electricity, Heat: Reserve Potential for Savings": "Relying on Experience: The Economy Should Be Economical"]

[Text] An important reserve potential for achieving savings in fuel and energy resources is the prompt and timely implementation of measures to restore worn equipment to its original state, to improve, renovate and update equipment, and to adopt advanced technologies. A great deal of experience in this area has been amassed in this industry.

This year a considerable amount of work is to be performed at the thermal electric power stations of the USSR Minenergo [Ministry of Power and Electrification] system to make them more economical and to achieve an overall annual savings of approximately 300,000 tons of standard fuel; adoption of measures aimed at increasing utilization of installed turbine capacity, with savings of more than 85,000 tons of standard fuel; increasing the operating efficiency of cooling towers, etc. Particularly important is work on boiler equipment, the reliable and economical operation of which determines in large measure the operation of the entire thermal cycle at a thermal electric power station.

Sealing boiler furnaces and flues is one of the most simple devices but also a highly effective measure. Prompt restoring of their seal is characterized, for example, by the following annual fuel savings figures per boiler unit.

Sealing the furnace chamber with metal sheathing (according to the experience of the Starobeshevskaya GRES) can generate savings of 5,000 tons of standard fuel apiece at the Voroshilovgrad, Zmiyevskaya, Moldavian, and Burshtynskaya GRES, with TP-100 and TPP-210 boilers. Sealing the furnace and flues with glass-reinforced plastic and employment of self-sealing bulk insulation on the overhead, and spraying of gunite make it possible to save 750 tons of standard fuel. Such preventive measures as these are effective for PK-39, TPYe-208, TP-100, and TP-108 boilers, as well as for PK-41-1, TP-92, PK-33, and PK-47 boilers at the Irikhinskaya, Yayvinskaya, Verkhne-Tagilskaya, Troitskaya, Smolensk, Shaturskaya, and Starobeshevskaya GRES.

Renovation of the furnace chamber lining on the PK-41 boiler at the Konakovskaya GRES is estimated to produce savings of 2,000 tons of standard fuel. Sealing

the furnaces and flues of the Ye-250-100GM and Ye-420-140GM boilers at the Sterlitamakskaya TETs will produce savings of 1,600 tons, and partial replacement of the flues on the Ye-420-140GM boilers at the Novo-Salavatskaya TETs will save 2,000 tons of standard fuel.

Savings of 300 tons of standard fuel apiece on TP-108, TPYe-208 and TP-100 boilers at the Starobeshevskaya, Smolensk, and Shaturskaya GES can be achieved by protecting flue gas paths against corrosion and mechanical wear with cast stone, acid resistant tiles, epoxy filler and other protective coverings.

Significant fuel savings can be achieved by renovating regenerative preheaters. These measures include upgrading peripheral seals with installation of graphite plates, replacement of RVP [regenerative preheaters] packing, adoption of a radial seal gap following mechanism, etc. On the average actual savings per boiler are estimated at 300 tons of standard fuel for TGMYe-206KhL, TGM-94, TGMP-114, P-57, TPP-210A, TGMP-204A, TGMP-314A, and TGM-96A units. Such boilers are operated at the Nevinnomysskaya, Troitskaya, Lukomlskaya and Uglegorskaya GRES, at Kiev TETs-5 and at the Severnaya GRES in Azerbaijan.

Considerably greater savings can be achieved at some power plants: for example, the effectiveness of renovation of an RVP-68 with an increase in the layer of cold packing on a TGMP-114 boiler of a 300 megawatt generating unit at Kostroma GRES generates an estimated savings of 750 tons of standard fuel; replacement of one layer of RVP packing on a P-39 boiler at the Troitskaya GRES is estimated at 1,000 tons; installation of enameled RVP packing on a BKZ-420-140 boiler at the Kuybyshev TETs -- 500 tons. Employment of ceramic RVP packing, according to the experience of the Lithuanian GRES, will make it possible to save 1,200 tons of standard fuel apiece on TGMP-314, TGMP-114A, GMP-114, and TGMP-324 boilers at the Lukomlskaya, Syrdarinskaya, Stavropol, Irikliinskaya, and Sredneuralsk GRES and the Lenenergo GRES-19.

Adoption of new protective and basic packings resistant to clogging with slag on the RVP of the P-57 boilers of two generator units at the Reftinskaya GRES will make it possible to save approximately 3 million kilowatt hours of electric power per year on each unit. Renovation of the peripheral RVV [expansion unknown] seals on the boiler at Sumgait TETs-1 is estimated to produce savings of 600 tons of standard fuel.

Considerable savings can be obtained by renovation and prompt rebuilding of worn tubular preheaters and economizers. For example, replacement of the small preheater units on the TP-47 boiler at Saransk TETs-2 will make it possible to save 800 tons of standard fuel. Installation of a series-connected air preheating system in the tubular preheaters of the PK-38 boilers at the Berezovskaya GRES in Belorussia will make it possible to save almost 98,000 rubles per unit. Adoption of a glass preheater on the BKZ-75-39GM boiler at the Beltskaya TETs will make it possible to save 120 tons of standard fuel.

The efficiency of economizers is estimated, for example, with the following figures. Replacement of the stage I economizer on the BKZ-210-140F boiler at the Kirovskaya TETs-4 and on the BKZ-320-140 and BKZ-420-140 at the Omsk TETs-4 will produce savings of 500 and 1,000 tons of standard fuel respectively;

renovation of the economizer on the TP-101 boiler at the Estonian GRES -- 2,500 tons.

Improvement of burner equipment produces savings. Installation of TgKTI flat-jet burners for coal combustion in the TP-240 boiler at the Cherepetskaya GRES will make it possible to save 1,200 tons of standard fuel. Conversion of burner equipment on the BKZ-320-140GM boiler at the Yefremovskaya TETs to residual fuel oil and gas combustion in a low-temperature straightthrough-swirl jet will produce savings of 2,300 tons of standard fuel; upgrading of the furnace chamber on the BKZ-160-100GM boiler at the Voronezh TETs, with installation of crossed burners for burning natural gas will make it possible to save 2,500 tons; installation of hearth burners on the TPP-312 boiler at the Ladyzhinskaya GRES for burning a coal mixture will make it possible to save 300 tons of standard fuel. Renovation of the discharge burners of the TPP-210A boiler at the Tripolskaya GRES will make it possible to save 400 tons of conditional fuel in burning anthracite dust; installation of residual oil burners based on the experience of this GRES for melting slag on boilers with liquid slag removal will produce savings of 600 tons of standard fuel per unit, applying to TPP-312, TPP-210, TP-90 and TP-100 boilers at the Ladyzhinskaya, Zmiyevskaya, Pridneprovskaya, Starobeshevskaya, and Voroshilovgrad GRES.

Adoption of residual oil combustion with extremely low air excesses on five TM-84 boilers at Lenenergo GRES-19 is estimated to generate savings of 500 tons of standard fuel. Execution of an aggregate of measures specified by guideline instructions for converting gas and residual oil boiler units to residual oil combustion with minimum excess air (Moscow, SPO Soyuztekhnenergo, 1980) at the Sredneuralsk, Ali-Bayramlinskaya, Lithuanian, Nevinnomysskaya, Dzhambul, and Syrdarinskaya GRES, with TGMP-114, TGMP-314, TGM-94, and PK-47-3 boilers will make it possible to save 3,200 tons of standard fuel per unit.

Efficient utilization and renovation of draft equipment, as well as flue gas spaces continue to be of critical importance. For example, replacement of the VDN-18 blower on the TP-150 boiler at the Arkagalinskaya GRES will make it possible to save 300 tons of standard fuel. Installation of an arrangement for utilizing overflow air from RVP-88 seals at Kiev TETs-5 will produce savings of 250 tons of standard fuel; adoption of an arrangement for drawing air from RVP by a gas recirculation induced-draft fan and locating the air duct inside the gas duct to the RVP on the TGMP-314 and TGMP-314A boilers at the Lukomlskaya and Stavropol GRES is estimated to generate savings of 1,000 tons of standard fuel apiece.

Considerable fuel savings at thermal electric power stations is provided by keeping boiler external heating surfaces clean. Adoption of water blast cleaning of furnace screens on TPYe-308 boilers at the Cherepovets and Smolensk GRES will generate savings of 400 tons of standard fuel apiece. Cleaning of platen and convection superheaters with "cannon" blast on the TPP-312, TPYe-208, and TGMP-204A boilers at the Smolensk, Zaporozhye, and Uglegorskaya GRES and Zuyevskaya GRES-2 will make it possible to save 600 tons of standard fuel apiece. Adoption of gas-pulse cleaning on peak-load water-heating boilers and on the RVP of the BKZ-160 boiler at Lenenergo TETs-7 will make it possible to save 400 and 900 tons of standard fuel respectively. Employment of steam blast on the

two BKZ-320-140GM boilers at the Razdan GRES will produce savings of 500 tons, while installation of a shot-cleaning arrangement with remote control on the TM-84 boiler at the Novopolotskaya TETs -- 600 tons of standard fuel.

Cleaning of regenerative preheaters utilizing a compressed-air pulse blast unit on the TGMP-204A and TP-200 boilers at the Zaporozhye and Burshtynskaya GRES is estimated to generate savings of 390 and 150 tons of standard fuel respectively.

Considerable savings can be achieved by improving pulverizing and oil handling. For example, based on the experience of the Starobeshevskaya and Burshtynskaya GRES, installation of high-concentration pulverized coal feed arrangements on the PK-40 boiler at the Tom-Usinskaya GRES, on the TPP-210A boiler at the Novocherkassk GRES, and on the TP-80 boiler at Lenenergo's Pervomayskaya TETs will produce savings of 1,000, 1,000, and 200 tons of standard fuel respectively.

Replacement of sanitation engineering grade air heaters with SO-110 power engineering grade on the 300 megawatt unit at the Ryazan GRES will produce savings of 1,000 tons of standard fuel, installation of air heaters on the BKZ-220-110 and BKZ-190-110 boilers of the Kazakh SSR Ministry of Power and Electrification system thermal electric power stations -- 300 tons apiece, and on the TGM-104 and BKZ-320 boilers at the Razdan GRES -- 500 and 300 tons of standard fuel respectively.

Adoption and dissemination of the above-enumerated measures will help thermal electric power stations achieve and surpass plan-specified targets of specific consumption of standard fuel for generating power.

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CSO: 1822/326

## GENERAL

### COORDINATION CENTER WOULD SOLVE MANY PROBLEMS AT EKIBASTUZ FUEL-POWER COMPLEX

Alma-Ata NARODNOYE KHOZYAYSTVO KAZAKHSTANA in Russian No 3, Mar 83 pp 17-22

[Article by V. Filatov: "Ekibastuz: "High-Voltage Energy"]

[Text] At the Pavlodar-Ekibastuz Regional Production Complex, build up the mining of coal and continue to erect large GRES's of 4-million kW capacity." (From "The Main Directions for Economic and Social Development of the USSR During 1981-1985 and During the Period up to 1990.")

#### Great Strides

The economists estimated that, for ETEK [Ekibastuz Fuel and Power Complex] to start working at full force, 7.6 billion rubles should be invested in its development. This amount of capital expenditure was necessary for further building up the basin's capacity, for bringing annual fuel production up to 170 million tons, for introducing four thermal electric-power stations with a total capacity of 16 million kW in the immediate vicinity of the source of their sustenance, and, finally, for building housing with a total area of 1.2 million m<sup>2</sup> and a large number of facilities for social and domestic-amenity purposes.

A most important document, which was issued in March 1977, gave the force of law to these impressive prospects for developing the Pavlodar region and, thereby, also to the findings of the scientists. It was entitled, "On Creation of the Ekibastuz Fuel and Power Complex and the Construction of the 1,500-kV DC Ekibastuz-Central Economic Region Electric-Power Transmission Line." It was a joint decree of the CPSU Central Committee and the USSR Council of Ministers. The mammoth scale of the work and the nationwide importance of the economic and social tasks that are being solved placed ETEK in the ranks of the construction projects of the century: the BAM [Baykal-Amur Mainline], KamAZ [Kama Motor-Vehicle Plant] and Atommash.

It is indeed impossible to overestimate the role of this field. The 180-meter thick coal formations, which emerge directly at the earth's surface, constitute real wealth. About 14 billion tons of fuel have been concentrated in a comparatively small piece of ground. And not far away still another store is secreted--the Maykubenskiy Basin. Neither are its reserves small.

The geologists estimate that they exceed 2 billion tons. This corner of Kazakhstan is genuinely unique. It has thus been called upon to become a unique center for the country's fuel and power industry by 1990.

The coal's accessibility--the possibility of mining it by the strip method--also determined the scale of its development. Thanks to the introduction of rotary equipment (89.7 percent of the fuel is removed by it), the prime production cost of Ekibastuz "sunstone" is the lowest in the country--1 ruble and 32 kopecks. And the output per worker here is also the highest among similar production facilities. That is why already today every 10th ton of coal mined in the country comes from the Pavlodar stokehole. From this also comes the effectiveness of its economics: while profit has now been brought up to 300 million rubles, in the next few years it can be doubled.

It is during the current five-year plan that the basin is expecting major changes. By the end of it, in particular, it is planned to bring the amount of fuel mined up to 84 million tons. And by 1990 it is planned to mine 115-120 million tons. Ekibastuz will pass a basically new turning point in its development.

The scientists have proved that the major portion of the field's coal (35-40 percent of it consists of useless rock) is, for the most part, burned much more advantageously on the spot, in power-station fireboxes. And the electricity received will be transported more conveniently by far and much cheaper by wire. Thus was born the unique project of transmitting a gigantic amount of electricity, from the Irtys region to the country's Central Economic Region near Tambov. More than 40 billion kWh of 1,500-kV electricity will be "driven" annually over this power bridge, which has no equal in the world, over a distance of 2,415 km. Moreover, still another stream of electricity will get its start here, but 1,150 kV of AC. It will "flow" to the Urals. The builders, when this concept is realized, will transform North Kazakhstan's Power System into the most important component of the country's Unified Power System.

Erection of the first of Ekibastuz's GRES's got underway in 1975. But the party and government decree named above had given a new and powerful impulse to the work at ETEK. And, since 1977, the pace of operations has almost doubled. Especially memorable here are these landmarks. The placement of the first reinforced-concrete pile "shoe" in the foundation footings of the main building by V. Sizintsev's brigade. These mighty "stumps" were laid successively over the almost 800-meter length, in 3 rows over the more than 300-meter width. The promotion of work on erection of the "house" for the power units, which another collective--that of N. Yedykh's--performed. And behind the builders, the thermal power unit installers under B. Aralbayev and N. Maslov undertook assembly of the boiler and the turbine.

Yesterday's recruits of the All-Union shockwork construction project--representatives of the country's Komsomol personnel--succeeded in realizing what had been planned. Twenty kilometers from Ekibastuz they breathed life into almost 30 large and small production facilities. And so construction of the power station's main building has practically been completed now, and five power units, each of 500,000-kW capacity, have been switched on for operation.

Customers have received about 15 billion kWh. The power-engineering builders, answering with deeds the decisions of the November 1982 CPSU Central Committee Plenum, have applied their efforts toward completing erection of the GRES this year. Fulfillment of this task will enable the date of construction of the next Ekibastuz stations to be brought closer. 5

Social and domestic-amenity facilities were also erected, along with the industrial facilities. Suffice it to say that every second resident of the city has improved his living conditions. Overall, the builders have now assimilated about half a billion rubles. You will perceive the great strides just from a simple list of the names of what has been erected. In brief, much has been done, but ahead are new horizons.

### Positive Experience

It should be emphasized that there are not many construction projects in our country such as ETEK whose experience could be entirely borrowed. It is true, the designers did take into account a bit of what was available from the practice of power-station erection. Thus, for example, the modular flow-line method of erecting power equipment that was executed at the Slavyanskaya station was given attention. In principle, this method was spread here also, but here they had to adapt it to the Ekibastuz scale: the power-engineering equipment had to be installed in the form of large components, and the power units were installed by the flow-line method. That is, two turbines were under assembly simultaneously.

Such an approach is more effective economically. It opens up the possibility for accelerating all the operations. For Ekibastuz this is especially important: for 40 power generators are to be started up for operation here. The assembly-line variant of erection will make an Ekibastuz kilowatt cheaper per ruble of capital investment.

But this is not the only factor of the positive experience gained by the creators of the Ekibastuz "constellation." The words, "for the first time," resound here fairly often. For the first time, for example, in erecting such a large industrial complex, a high-capacity regional production-outfitting base was subdivided. The advantage is simple: not to allow a single board or a single nail to be lost. But it is completely possible for wastefulness to occur--the industrial site had to receive large amounts of all possible kinds of freight. Such an approach to the reception and distribution of materials and equipment has also opened the way for the flow-line movement at the construction project.

There is more. In order to speed up the installation of power equipment simultaneously with the station's main building, a building for assembling the equipment was erected. Weighing up to 50 tons, the units were delivered to the machine hall. Such an industrialization of operations has reduced by far the time taken to install components and assemblies. This shortened also the time taken to turn the "500,000-ers" over for operation. In essence, two each have been readied annually in past years.

Innovations to which some builders' brigades have resorted have proved themselves well. Thus, the collective that was under Kazakh SSR State Prize winner V. Sizintsev, which grew to 100 people, used a singular form for organizing the work. In order to simplify the management of this large number of people, they were divided into three groups, each of which was under an experienced worker. From this came the term, "shift brigade leader." Thanks precisely to this organization of work, the station's main building actually rose more rapidly by far than if it had been erected as usual: with a multitude of brigades that answer only for their own narrow part of the work. And the collective's achievements are clear: each year it has assimilated at least 1 million rubles. Even last year, when there were no material-intensive operations, Sizintsev's men came up to their old accustomed mark.

And the thermal-equipment installers of B. Aralbayev also have distinguished themselves. They applied the so-called component-by-component method for assembling a boiler unit. Its essence is that each team was engaged strictly in its own operation. Polishing their experience and specializing, such groups of people, united by a single task, have proved that they can solve the most complicated tasks. Thus, despite the fact that the boiler units arriving here incorporated much that was new, B. Aralbayev's brigade undertook the assembly of each of them extremely successfully. And while, at one period of its formation, it erected only one per year, in a later period it erected two each year.

The rotating-duty method of organizing labor also helped to increase effectiveness of the work at a certain stage of GRES construction. Not having at their disposal a construction-industry type base for solving the housing question, they relied widely here on imported specialists, who were brought in for a limited time. And this, we repeat, justified itself. A whole army of temporary workers that numbered as many as 50,000-60,000 people in its ranks operated here.

But perhaps the following facts and figures will prove to be the best of all the experience of the power-engineering builders.

In the time that has elapsed since publication of the CPSU Central Committee and USSR Council of Ministers decree about developing Ekibastuz, large amounts of work have been done. Erection of the first GRES has been completed, work on the second station has started, a housing construction combine to produce 50,000 m<sup>2</sup> of housing is being erected, the new Vostochnyy strip mine, which can produce up to 30 million tons of coal per year, is being laid out, the Severnyy, which is called upon to provide fuel for electric-power stations in the amount of 35 million tons per year, is being rebuilt, and work at the Maykubnsk Basin, which will send out up to 20 million tons of coal per year, is in progress. Finally, modern housing blocks are being raised in Ekibastuz....

Such is the scope of the job at ETEK. However, it could be even more impressive. Unfortunately, not everything here has occurred as one would like. But this is another matter....

### ...And the Negative Experience

Let us start with the fact that the complex's builders still have not reached the pace originally set by the schedule. Many factors are making themselves felt; primarily the crash work that was being permitted at the very start of GRES erection. This was reflected in the fact that earthmoving operations were drawn out for almost a year. In particular, the matter of preparing foundation pits for footings for the main building and a 330-meter smoke-stack had advanced slowly.

At one time, for example, there was no concern about the prerequisites for storing equipment, and, being subjected to rain and snow, cold and the wind, it went out of operation too often. Moreover, there were not enough equipment operators. The organization of work and of this handful of specialists had not been set up in the best fashion: two-shift operation had not been resorted to.

However, blame for the slow pace of construction lies also on "outside" collectives. For instance, the transport construction workers from the former Pavlodarstroyput' Administration did not lay the 20-km highway from the city to the industrial site within the norms set for doing so. The state of affairs in the laying of second track on the Pavlodar-Tselinograd line was disturbing in the greatest degree. During work on this construction project, they were made to answer strictly, and the situation on the highway was made a matter of interest from time to time.

And to crown all the trouble, the Ekibastuzenergostroy [Trust for the Construction of Ekibastuz Power-Engineering Facilities] collective also missed deadlines for putting the building for the installing organizations into operation. This was a kind of plant for the consolidated assembly of power-engineering equipment. However, even here a lag of almost a year was permitted.

As a result of this attitude of the builders toward the job assigned to them, the plan for the first 2 years for the erection of the GRES's failed completely. Barely more than 90 percent of the capital investment had been assimilated. Overall, this was 219 million rubles. Two power units were not turned over for operation on time. This is how the attitude of our in-house and of outside builders toward the job was manifested. Incidentally, the matter of attitude toward the job and toward valuable property and equipment can be a completely separate subject. The fact is that the USSR People's Control Committee found here a case of flagrant wastefulness. Almost all the trust's supervisors were severely punished, but the attitude toward the people's good changed for the better extremely slowly.

This case, in combination with others, throws enough light, it would seem, on the state of affairs that exists here. That is why the fact that the work pace does not correspond to what was planned does not, on the whole, cause any special surprise. True, in analyzing the causes of failure of the plan, it cannot be forgotten that personnel problems played a role of no small importance.

The trust is chronically short of workers. The collective has twice been rejuvenated during its existence. Actually, it could not be otherwise: the

trust has a most severe problem with housing. USSR Minenergo has tried for a long time to solve the apartment problem in Ekibastuz by importing housing-construction structure here from its own enterprises. They came to the city from almost all ends of the country--the Kuzbass [Kuznetsk Coal Basin], Siberia, the Urals, North Kazakhstan. So these circumstances tell something about the flow of materials. Without going into too much detail, let us say briefly: it took more than 3 years to erect the first dormitory.

Scarcely more than half of the 254,000 m<sup>2</sup> planned for turnover during 1977-1979 was readied. Altogether, during the 10th Five-Year Plan, the shortfall was 3 kindergartens, a social and shopping center, a House of Amenities, a hotel, a Palace of Culture, an athletic complex with two swimming pools, a stadium and a large number of other vitally necessary facilities.

"But the situation is slowly changing for the better," says G. Kaskadakov, hoist operator of Ekibastuzshakhtostroy [Ekibastuz Mine Construction Combine] and delegate to the 26th CPSU Congress. "It indicates directly the attitude of the managers of USSR Minenergo, Ekibastuzenergostroy, USSR Minugleprom [Ministry of Coal Industry] and our enterprise toward housing. It is given last-priority attention. From the start, the concern has been erection of the industrial complex. All kinds of accounts and reports are written about matters there, strict inquiries are made about it. During emergencies, the workers who are building city projects are taken off them without a moment's hesitation and sent to do crash work on the industrial facilities."

This statistic tells much about the place that housing occupies in the problems of erecting ETEK. Out of the army of 11,000 of Ekibastuzenergostroy's construction workers, something more than 1,000 workers are engaged in it. Half the apartments erected in the city are turned over in great violation of the deadline. About 9,000 people in need of apartments are waiting in line. That is why everyone here still is counting on temporary-duty workers.

It is the shortage of specialists that has led to the builders, starting with the first power unit, dragging a long tail of unfinished jobs behind them. And they made up a substantial total--4.5 million rubles. All these are, as they say, support facilities: the domestic-amenities building, the dining hall, storage premises, and a repair building. The amount of unfinished work for the latter units is a smaller figure--half a million rubles. Shortfalls in the work are being eliminated basically by the efforts of arrivals, but to live this way, forever relying on the kind uncle, is no way out of the situation. That is why, in order to retain personnel, it is necessary, as quickly as possible, to step social-support facilities up to the same pace of growth as the power-engineering facilities. And it is primarily necessary to speed up the erection of large-panel housing construction. It is, for its own ministry, still a short of stepson. And it is financed at last priority, and the progress of its erection is poorly monitored. As with all the jobs here, the new enterprise is erected according to "tradition": already it lags behind schedule by half a year.

If the housing does not soon keep pace with the construction of power-engineering capacity, then it is entirely possible that the time will come when there will be no one to man the turbine-control desk. Thus, the problem of

power-engineering personnel is no less a threatening problem. In brief, a step-up in the pace of housing construction is today a basic problem for successful operation of the whole fuel and power complex. This is, on the whole, the concern of all who are connected with ETEK.

#### Problems of Internal Order

In speaking about problems of an internal nature, it is necessary first of all to turn to questions of work organization, to discipline. Socialist competition, for example, is not without elements of formalism. Here are two examples: twice commitments were undertaken to introduce the first power unit and both times they failed ignominiously.

It would seem that this experience should have taught the construction site and the party something, but alas: the deadlines for starting up the operation of the next units were signed for, but the deadlines were not met. Such things occur because sometimes summing up the results of the labor rivalry is reduced to a meaningless document--a checkmark has been made. For example, in the cases of Energozhilstroy [Housing Construction Administration for Power Engineering] and Energootdelstroy [Construction-Finishing Administration for Power Engineering], this circumstance led to a drop in the activeness of the workers. There was no graphic comparison of the results, nor was there an interest in the competition. This circumstance has also influenced the matter: in Ekibastuz, 70 percent of the apartment houses are turned over with a "satisfactory" rating; but then, after turnover, the construction workers have to return to the buildings several times.

"We sometimes have no place to learn, to raise our skill levels," electrical welder V. Chmelev of Ekibastuzenergostroy shares his judgments. "And traveling schools of advanced experience and contests for vocational skills could play a role here. Undoubtedly, such an approach to personnel would increase the detachment of capable specialists who know their jobs excellently."

One cannot help but agree with such a posing of the question: the ETEK's young builders still have an average skill rating that is lower than what is set by the organizational schedule. And indeed this is a vast reserve--more than 50 Komsomol youth brigades are now toiling at the industrial site. Raising their skill levels could thus sharply increase labor productivity, which, among other things here, has not reached the planned goal.

And how is it explained that about 2,000 young men and women have no place at all to study? This is a vast force potentially capable of greatly improving the personnel composition of the construction workers. And here the matter is held up by the state of organizational work. And it must be said again that it is not at a high point. Incidentally, we are not without grounds here. Because of absenteeism, off-time with consent of the administration, and idle time within shifts, the trust loses up to 10,000 man-days of worktime annually. During the first 2 years of the collective's existence this figure was 5-fold as much!

This problem is far from ordinary. Given the scale of this complex, it is quite large. For example, as a result of work-hour losses, the builders underproduce almost 100,000 rubles worth of output annually.

### ...And Problems of an External Nature

The Ekibastuzers literally have collided with these ever since the first steps in realization of the design for creating the TEK [fuel and power complex]. There are many problems, but we shall single out the main ones. One of them is the supplying of materials and equipment. Thus, during the first 3 years of GRES construction, USSR Minenergo enterprises that were oriented toward Ekibastuz fell short here on the order of 70,000 m<sup>3</sup> of reinforced-concrete products, 10 million bricks and 20,000 m<sup>2</sup> of housing-construction parts. And taking first place here is Energostroyindustriya, the industry's very own trust.

For example, it systematically impedes the shipment of small parts and violates the deliveries' schedule. Materials often arrive in incomplete sets. The situation is aggravated still more by the fact that, as a rule, one-third of the output shipped comprises poor-quality versions. While the builders have already suffered for a long time now because of the suppliers, the power engineers have suffered comparatively recently, actually since the startup of operation of the first power units.

Power equipment manufactured at Minelektrotekhprom [Ministry of Electrical Equipment Industry] enterprises in Kharkov, Barnaul, Novosibirsk and Leningrad are letting the operators down badly. For example, the first four boiler units have large numbers of all kinds of deficiencies: the tubes leak, and the quality of the factory welding is no good at all. The power workers have already spent more than 500,000 rubles on adapting them.

But the ministry, judging by the latest deliveries of equipment, has done hardly anything to raise the reliability of its output. Here is the record on stoppages of the fourth power unit, which was started up in operation in 1982. From the station's "watch log":

"From 10 June to the 15th stood idle, carrying out intermediate repair. From 17 June to 4 July, repaired the circulation pumps, replaced the stator core and worked on the bearings. From 4 to 11 July, the induced-draft fans were renovated." There's no sense naming the whole list of stoppages. In the final analysis, the power unit was put up for repair.

Beyond a doubt, the trouble here is not just the poor quality of equipment manufacture. The heat-equipment installers, who did not assemble it with the proper expertise, also are at fault. Those very same temporary-duty specialists carried out the repair, for the most part. So it is that you involuntarily think about your own home-grown personnel. Ekibastuz needs an installers' trust. At one time USSR Minenergo even talked about it. But then the talk gave out. And everything remained as before: temporary workers are sent to assemble the power equipment. Can it be asserted that today, given the dynamic development of Ekibastuz power engineering, the rate for temporary workers is, in essence, a sound rate?

## The Complex Needs a Coordination Center

It would seem, from the data that have been cited, that it is quite clear that many of the symptoms observed during ETEK's growth bear the stamp of bureaucratic isolation. And this is clearly reflected in many other aspects. Well, just take this for an example.

As is known, Ekibastuz coal is high in ash content. Because of this, the boilers quickly become worn. Minelektrotekhprom sends them here with thin walls, without taking local circumstances into account. The equipment quickly goes out of commission. It would seem that the interests of two ministries should be joined here, but they cannot find a common language. As a result of such obstinacy, losses that the national economy must bear occur.

Or here is another problem. The miners, who are concerned about increasing the pace of fuel mining, reinforce the cutting parts of the rotary excavators. The buckets of the complexes can handle any parts of the coal seams. As a result, lumps that enter the power-station's grinders sometimes are so large that the teeth of the drums collapse, splinters from them fall into the boiler fireboxes, and so you can expect trouble.

The question arises, who will undertake, to start with, to unite the interests of several agencies? Who in ETEK can burden himself with this heavy task?

"In our opinion, a coordination center could take upon itself these and other concerns for developing the complex," First Secretary of the Pavlodar Oblast Party Committee P. I. Yerpilov expresses an opinion on how to solve the problem, which arose long ago. "It would be the one boss that would possess the corresponding authority, whose decisions would be binding upon all construction-project participants. Incidentally, an acting commission of the party's obkom is constantly solving this problem to some degree. Thus, it stood up for its variant of the buildup of the power complex. The designers wanted to build self-sufficient settlements close to each GRES. The commission proposed, on the contrary, to build housing and facilities for social, cultural and domestic-amenity purposes in Ekibastuz itself. And to build a high-speed railroad to connect the power enterprises with the city."

It is true that, while the first part of the commission's idea was implemented successfully, in the case of the second the problem was resolved only last year, because of the nonconcurrence of three ministries--Minenergo, Minugleprom and the Ministry of Railways. The road has been turned over for operation, and electric trains have been running over it. But before this, Minenergo spent 4 million rubles annually on upkeep of a bus fleet in Ekibastuz.... And so it is that the work experience gained by the commission is persuasive that a coordination center could operate very successfully at ETEK.

Resorting to analogy, one can also refer to an interesting fact that also argues in favor of creating this organ. In the past, during erection of the Urals-Kuznetsk Basin, an interagency commission operated under the supervision of V. V. Kuybyshev. All the management levers over the largest construction project up until that time were concentrated in his hands. It is believed

that a coordination commission similar to the commission mentioned would play a role just as important in the shaping and development of Ekibastuz.

The more so because the problems of starting up the electric-power stations are not decreasing but are even increasing. Judge for yourself. The concerns of the power engineers were already covered above, so now we turn to the needs of the miners and all the city's residents. As a result of the buildup of coal capacity, several million tons of rock have accumulated in the dumps. First, the rock is taking up ever more space, and, second, it is polluting the atmosphere. But this is only a small loss. What will happen when, with the introduction into operation of all the electric-power stations, ash and slag waste will pile up at the rate of 30 million tons annually? No one has tackled this question yet.

And it looks as if the complex's social development is becoming more complicated. Here, as has already been pointed out, there is a shortage of several thousand specialists. They can be attracted here only by creating good conditions. In any case, the standard of living must be raised, even more, by far, than in other regions where conditions are more favorable. And today, as we already know, Ekibastuz lags behind in the construction of housing and facilities for social, cultural and domestic-amenity purposes.

The questions that will arise before the coordination center thus will not be simple. And, it would seem that its birth is, for ETEK, a vital necessity of the time. The creation of this organ promises to bring to bear all the complex's vast reserves. But the task of raising the effectiveness of any production facility, it was emphasized at the November 1982 CPSU Central Committee Plenum, was and will remain the main thing for the national economy.

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